Winter 2002

ACUTA Journal of Telecommunications in Higher Education

acuta *Journal*

of Telecommunications in Higher Education

This Issue: Customer Relationships — High Tech, Soft Touch

FEATURE OVERVIEW

Multiple Protocols

With support for all popular VoIP protocols, the IP250D platform is flexible enough to support present and future initiatives.

Speakerphone

The IP250D features a high-quality speakerphone for convenient hands-free conversations. Full headset compatibility adds even more flexibility.

Hassle-Free Setup

The IP250D configures in seconds, and offers comprehensive troubleshooting menus to resolve conflicts fast.

Flexible Call Control

Powerful, popular features such as call forwarding, conferencing, shared lines, memory dialing and more provide options to the entire range of users.

User Programmable Function Keys

The IP250D allows users to program their own feature keys, cutting down on management overhead, while enhancing user security and privacy.

Supports DHCP and Manual IP Addresses

No matter how you assign IP addresses, the IP250D responds and works flawlessly.

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Need VoIP?
Here's the right call.

TELEDEX

VoIP NETWORK TERMINAL

Sound Thinking.

Millions of people in the world have used a Teledex telephone, without even realizing it. That's because we've been the world's leading supplier of durable telephones for the global hospitality industry for two decades, with sets installed in hotels in over 125 countries worldwide. Teledex has pioneered virtually every new feature that makes a hotel telephone unique, and we've extended that innovative thinking into our IP phones as well. Sleek industrial design, married to an intuitive, clean user interface, makes this a VoIP terminal that quickly becomes the campus favorite, without breaking the bank.

Innovative Design.

Rather than stuffing new technologies into an outdated, clunky case, we worked with the world's leading industrial designers to come up with a harmonious design and interface that does justice to the power of VoIP. The result? An elegant terminal that's highly intuitive even for beginners, making the migration from standard PBX to VoIP seamless. Programmable feature keys, backed by an informative, easy-to-read LCD display, bring rich functionality to the desktop, without swamping the help desk with rudimentary questions. Advanced audio technologies help deliver the best possible user experience.

TECHNICAL SPECIFICATIONS

Dimensions
Width:	8.8"
Depth:	7.0"
Height:	3.8"
Weight:	2.2 lb.

Color
Charcoal Gray

Power
Network or local adapter

Feature Keys
10 programmable for memory dialing or feature activation

Display Keys
Settings, Program, Directory, Contrast, Scroll

Line Keys
Hold, Line 1/2, Conference, Mute, Speaker/Headset

Function Keys
Forward, Messages, Transfer, Redial, Volume up/down

Display
LCD, 3 x 16, backlit

Protocol Support
Cisco CallManager 3.1 or higher
SIP
MGCP

Codecs
G.711µ/A
G.723
G.729 AB

Approvals
89/336/EEC
EN 55022
EN 61000-3-2
EN 61000-3-3
EN 55024
EN 60950 (CB Scheme)
FCC Part 15 Class A

Audio Enhancement
VAD
Dynamic Jitter-Buffer
Voice Compression
Echo Cancellation
Silence Suppression

Audio Input/Output
Handset, RJ-10 connector
Headset (not included), 2.5 mm jack
Microphone (built-in)
Speaker (built-in)

Network Connection
Ethernet — 10/100 BaseT
Two RJ-45 jacks
— Uplink to network and switch
— Pass-through, switched, for PC

Events Calendar

Event	Date	Place
Winter Seminars	January 12 – 15, 2003	Wyndham Buttes Resort Tempe, Arizona
Spring Seminars	April 27 – 30, 2003	Sheraton Norfolk Waterside Norfolk, Virginia
Annual Conference	July 27 – 31, 2003	The Westin Diplomat Resort and Spa Hollywood, Florida
Fall Seminars	October 19 – 22, 2003	Hilton San Diego Resort San Diego, California

ACUTA's Core Purpose is to: Support higher education institutions in achieving optimal use of communications technologies.

ACUTA's Core Values are to:
- Share information, resources and insight,
- Respect the expression of individual opinions and solutions,
- Maintain our commitment to professional development and growth,
- Advance the unique values and needs of higher education communications technologies, and
- Encourage volunteerism and individual contribution of members in support of organizational goals.

acuta

"
On most campuses,
every dorm room,
workstation, office, and
meeting room has both
a telephone and a com-
puter. Regardless of why
all the people who use
these devices are there,
they have one thing in
common: They are all
our customers."

Thomas Verlaan
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THE ACUTA JOURNAL OF TELECOMMUNICATIONS IN HIGHER EDUCATION

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PRESIDENT'S MESSAGE

Jeanne Jansenius
University of the South
ACUTA President
2002–2003

Customer Relations Management in the Knowledge Economy

It is often difficult to determine who the customer is and how to provide adequate and timely services. The evolution of the "Knowledge Economy"'has complicated this further by creating new rules for doing the business of providing products and services to our customers. Just as Amazon.com is one example of a one-stop shopping Mecca at the touch of a mouse, so access to the information we need to provide is now just a click away. Identifying our customers and being ready to meet—and even anticipate—their needs is more challenging than ever before.

Higher education institutions must continually seek new ways to gain competitive advantages while maintaining strong customer relations. For example, today's students often base their college admission decisions on their online recruiting experience. Typical campus Web sites include virtual tours and streaming video clips that provide information in an easy-to-use but exciting format. To be competitive, we must maintain a dynamic online presence.

The digital revolution also continues to dramatically change the way colleges and universities store and distribute volumes of knowledge. Knowledge comes in the form of raw facts and numbers that with today's information technology systems (portals) may be readily captured and easily accessed, connecting people via the Internet with the information they need in order to improve decision making in a seamlessly self-help manner.

Customer relationship management (CRM) software tools now enable self-served, personalized, customer-interaction centers to handle campus support functions among students, alumni, employees, and administrators. Integrated processes include career placement, class registration, academic curriculum development (course management packages), e-learning, and flexible personalized communication mechanisms for alumni career development efforts. CRM allows higher education institutions to customize and target services to students, faculty, staff, and alumni as we provide a totally connected and efficient environment. It can save admissions officers time and funds by focusing on high-yield prospects on an individual level, thus improving retention by being able to proactively identify the students at risk for attrition.

Online analytical processing of information can also support and enhance strategic decision making by combining campuswide knowledge camps such as financial aid, admissions, registration, and accounting. It

becomes quite obvious that this mandates an emphasis on security of knowledge, privacy, and policy issues such as intellectual property. Other issues might include data integrity and data ownership. It is important to remember the old adage of "garbage in...garbage out."

Communications technologists play a critical support and engineering role in making all this happen. The network must meet the demands of these personalized Web technologies. It is key that we understand and plan for the CRM impact on our respective campuses. We must also be aware of how data will flow through the organization and the timing demands of the flow. One major advantage might be the ability to leverage technologies. Additional questions to consider include the following:

• Does your campus have the technical expertise that is required to support CRM?

• What legacy systems will be affected, and how will they integrate with the new system?

• What additional hardware and infrastructure requirements will be necessary?

I encourage you to read Curt Harler's article on CRM; the interview with Lee Todd, president of the University of Kentucky; and other articles in this issue of the journal to gain a fuller understanding of the impact of managing customer relationships in the new era of the Knowledge Economy. Customer relations management processes along with the continued advancements in technology will be one of the main drivers for pushing services out to our customers.

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CRM Solutions Let Clients Help Themselves

by Curt Harler

The wisdom of the ancients says, "God helps those who help themselves." In the 21st century world, it is a college's staff of customer relationship management (CRM) professionals who are on the front lines. They may go by names like "bursar's office" or "alumni affairs" or "student life," but rest assured they all are managing relationships with key customers at the college.

Few things are more upsetting to a student than having a computer problem the night before a term paper is due. Not answering an alumnus's question about scholarship donations can hurt both the scholarship program and all of those who would benefit.

However, at any college conference it is typical for university staffers to complain about being overwhelmed. Unexpected day-to-day problems take so much time that they may fail to answer a routine question until an angry person shows up in front of their desk.

CRM Solutions

CRM software helps eliminate those and other problems by off-loading responsibility for handling routine problems onto a computer. That allows humans to focus on the tough or extraordinary problems. Run-of-the-mill questions such as what hours the bursar's office is open or how to recharge a campus calling card can be handled quickly and efficiently, 24 hours a day, without

> [W]hat had been a trickle of questions coming into USF's information technology department had become a flood. With 36,000 students and 4,000 faculty and staff, dealing with the usual routine questions became a nightmare for both those seeking answers and those who were supposed to provide support.

taking a busy worker away from other responsibilities.

"The idea is to let people help themselves," explains Christopher Akin, assistant director for information technologies at the University of South Florida, Tampa.

By 1999, what had been a trickle of questions coming into USF's information technology department had become a flood. With 36,000 students and 4,000 faculty and staff, dealing with the usual routine questions became a nightmare for both those seeking answers and those who were supposed to provide support. Akin began his search for a solution by looking for a trouble-ticketing system to allow the IT help desk to stay on top of questions. At USF, IT covers both the computer and the telecommunications functions.

"One of my colleagues came across a Web-based system for tracking and resolving problems," Akin recalls. The product was RightNow E-Services Center from RightNow Technology, Bozeman, Montana. "We really just stumbled across it."

A CRM application, RightNow is a powerful knowledge base that allows free-text or structured inquiries in any area. "Self-help was secondary at the time, but it turned out to be very helpful to us as well as to the clients," Akin continues.

After USF installed the CRM system, there was a 20–25 percent drop in the number of calls to the IT help desk.

Staffers simply log in to the Ask USF Web site and report or track difficulties. The system also tracks e-mail. USF uses the system for all computer help situations and to track the 14,000 stations on its Avaya G3R PBX system.

"With the Web-based system we could have agents or telecommunications staffers in the field access it remotely," Akin points out. This allows for prompt resolution of inquiries from anywhere.

Several other schools use a similar setup. Got a question about the University of Memphis? Ask Tom the Tiger. Tom is the tiger-style mascot/database that allows users to search by area, keyword, or phrase. It can be accessed at http://asktom.memphis.edu. There's even a cozy little nook called "My den" where users can log in to check the status of questions, access restricted information, or respond to update notifications.

The Cooperative Extension Service at Colorado State University uses a similar setup. At http://ext-colostate.custhelp.com users can search the database to find answers to thousands of questions. Marked by an upside-down question mark and the AnswerLink logo, it allows users to do keyword searches. If the information is not on AnswerLink, users can submit a question directly. This service allows farmers and other residents of the state to access Cooperative Extension information online, 24 hours a day. The answers are tailored specifically for Colorado situations.

Fathom This

While most schools' CRM application serves a fairly cohesive group of customers, Fathom.com is an e-learning consortium of universities and research institutions. Customers can pop onto the site at any time looking for a course on film appreciation, oceanography, or microeconomics. Started at Columbia University, it now boasts schools ranging from the London School of Economics to the University of Chicago, the University of Michigan, and Woods Hole Oceanographic Institution. In all there are 14 Fathom Network members (www.fathom.com, New York City).

The Fathom consortium offers online courses and seminars. It markets lectures, interviews, articles, performances, and exhibits by faculty, researchers, and curators from its member institutions. Fathom's reference content spans all disciplines and fields of study.

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ATG (Art Technology Group) outfitted Fathom with its online CRM application called Consumer Commerce Suite. ATG (www.atg.com, Cambridge, Massachusetts) develops integrated, online CRM applications.

"We had to have something that would support diverse audiences ranging from the internal school audiences to outside groups like AARP [American Association of Retired Persons]," says David Wolff, vice president, technology and production for Fathom.

Fathom offers content in three areas: free material, enrollment courses, and articles and reference material. Typical customers might be students looking for a credit course in a particular area, someone trying to improve career skills, or lifelong learners. Formerly called The Dynamo Server, the Suite lets Fathom customize the look of a home page for every member. So, the Columbia home page is slightly different than the one for the London School. Likewise, there are custom looks and feels for all of the distribution partners like AARP.

"Internally, these organizations have a number of distinct segments, including alumni and students," Wolff continues. "We can use the platform to support a custom campaign where Columbia e-mails its alumni information about courses created by Columbia faculty and offers them to the alumni at a discount."

While having a nifty CRM home page is nice, it is in the back-office where the CRM application shines. Once a customer decides to buy a course, the CRM handles registration and will follow up with offers for other courses. Rules for the offers are developed by distribution partners or the Fathom Consortium for its internal audiences.

Among other consortium participants are the British Museum, Cambridge University, the American Film Institute, and the New York Public Library. Materials from other colleges are made available, but the courses must be certified by a course review team located at Columbia.

USF App Spreads

With service levels like that, the popularity of CRM is expanding. "It just spread," Akin says of USF's CRM application. After the initial rollout, Akin's position expanded, putting him in charge of Web applications. He suggested Web-based CRM to other areas of the campus.

Financial aid, admissions, and the registrar's office were the next groups on USF's CRM bandwagon. "In the financial aid and scheduling offices the staff was so overwhelmed that they could not get back to the student." Akin's group suggested the CRM solution, and it was implemented.

"We got a huge response," Akin says. The system can handle questions ranging from when a particular office is open to when a student's financial aid information is due.

Not All Easy Street

"Investing in CRM applications that don't deliver tangible improvements in customer relationships is a waste of time and money," says Baris Dortok. He is president of Network Design and Analysis Corporation (NDA), a Markham, Ontario, Canada–based company that has provided integrated network quotations, order processing, and customer inventory solutions to carriers and large end users for 19 years.

Good customer relationships start by providing accurate and timely quotes to customers. The next step is providing accurate information on what customers have installed on their network or computer. "Surprisingly,

most CRM applications almost completely ignore these fundamental issues," Dortok continues.

Indeed, some studies show that CRM applications are on the bubble. Last September, Gartner, Inc., estimated that more than 50 percent of all CRM implementations through 2006 would be viewed as failures from a customer point of view because they don't deliver tangible improvements that make life easier and faster for the customer. Billing is the largest issue. NDA offers an alternative approach to billing for large-scale applications and is worth considering if the application involves a large university or other operation with large billing volumes.

How CRM Works

With CRM, students or staff members simply log on to the Web site to get answers to any questions—from making an Ethernet hookup to paying outstanding tuition bills. At the start screen, the program presents several categories. The student chooses the closest category and is presented with a further list of possibilities. There is also an option to enter a free-form question such as How do I add money to my student card? The computer will attempt to find the answer.

Just as human agents know that the flow of questions is seasonal, so too the CRM program adjusts for seasonal responses. "The program is constantly bubbling up answers to the most popular questions," Akin says. This also allows the knowledge base to offer related answers to common questions. At the end of a search, the student is prompted to let the system know if the answers offered helped solve the problem. The USF system has the answers, and CRM has improved markedly. "Today, there is very little that is dropped," Akin says.

The CRM software also keeps information "live." There is a review

date attached to all FAQs and other postings. Once a FAQ has been on the site for a year, it is pulled from public view and returned for updating. This eliminates faulty information due to staff changes, new phone numbers, or other routine changes.

Behind the Scenes

If he were starting a CRM project again, Akin says he would let the vendor handle all of the hosting because of ongoing maintenance issues. At first, USF did the hosting itself. "But it was a lot of work for us to upgrade and difficult to stay on top of things," he says. "It is easy to set up. But I believe in doing things the easy way. They do all the upgrades overnight. It's been nice," he continues.

He is pleased with the vendor, too. "I would choose this product again. It is very sound," Akin says. He also likes the company's help desk process—based, of course, on its own product.

More important, Akin says, is getting buy-in from all the groups using the CRM program. "If they are not willing to train to use the product, it will not work," Akin says. He found certain areas simply were not willing to commit to a Web-based CRM project.

About 200 staff members and customer service representatives (CSRs) at USF use the system. This includes people like those in financial aid, who may post a response to the program once a month, and 70 hard-core IT CSRs who are either first-line or second-line support.

Continuing CRM

Ask USF was publicized to faculty and staff via the school's automatic call distributor and other typical outlets. They had fewer problems reaching students. "Students go to the Web first when they need answers," Akin says. It's an age thing. "They've been raised that the Web is the thing to do."

USF will push its CRM program further out into the system. "I'd like to have every area that handles inquiries on the system," he says. His next focus will be to reach the alumni—telling them about campus events, discount programs, and the like.

Fathom released its version 3.0 this fall to do just that. Fathom now can take enrollment information from a third party and do real-time data transfer to the course providers that includes the student information and divvying up the payments.

"We want to get more of our course providers to integrate real-time enrollment and financial data," Wolff says. They are looking at an API-style (application programming interface) solution.

"We also want to integrate our scenario server to make it a more customized CRM experience," Wolff continues. "The trick is that each course requires different kinds of enrollment information. Our version 3.0 has an entirely new look and feel. It has new channels and a new homepage. Next, we will be able to take essays and narrative information in addition to the usual name and student number that we've been gathering."

All these schools have proved one thing: A well-executed CRM project not only helps the school's customers but also helps the school itself.

Curt Harler is a freelance writer and contributing editor to the *ACUTA Journal*. He is also a frequent speaker at technology events. Reach Curt at curt@curtharler.com.

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It's a Win-Win for MoBull Messenger

by Elizabeth W. Clarke

University of South Florida combines wireless technology and innovation to generate revenue and better communications for USF.

Last spring George Ellis, University of South Florida's IT associate vice president, and his IT team launched MoBull Messenger, a wireless coupon and information program that is garnering high marks from industry analysts, retailers, the press, and most importantly the students at USF.

MoBull Messenger allows USF students to sign up for discount coupons from area restaurants, sporting events, nightclubs, and retail stores that they receive on their cell phones, personal digital assistants (PDAs), and pagers. Also, as part of the program, students can sign up for real-time campus information updates such as class meeting changes, school closings, emergency alerts, and payment deadline reminders. The university is expecting to gross $125,000 in the first year alone from the program, and participating retailers are reaping up to 10 percent return.

The Solution to a Problem

When asked how USF came up with the program, Ellis, the mastermind behind MoBull, wryly answers, "Necessity is the mother of invention." Faced with $900,000 in cutbacks in state funding due to the economic downturn, Ellis and his IT team were suddenly tasked with leveraging technology as a source of revenue.

"As Christopher Akin, my assistant director of information technology, and I saw our funding shrinking, we realized we had to really think about developing IT systems which would not only enhance our university's operation but would also generate revenue," continued Ellis.

Ironically, at the same time students were telling the university that they wanted to be in closer touch with their administrative requirements, such as financial aid applications and payment deadlines. Ellis had noticed that most of the student body was well equipped with digital devices. USF conducted a poll and found that 91 percent of their 37,000 students carried a cell phone, while 9 percent carried a pager or PDA.

An idea began to form in Ellis's mind, and he and Akin started batting it around: "What if we interfaced an application with our administrative system which could wirelessly keep our students notified of class meeting changes, emergency alerts, and payment deadline reminders, and used the same system to offer discount coupons to our students from our area retailers?"

According to Akin, they knew they could build such an application internally, but they weren't sure that they could successfully send the message coupons out to all the

different devices and across all the different networks.

"We knew this portion of the project could cause a lot of problems so we had to look to solution providers who had the expertise to solve this part of the puzzle," continued Akin. USF chose a wireless platform from Air2Web, which is known in the industry for its ability to take information out to more than 700 digital, wireless devices, with any carrier and across any network. Once USF had the delivery platform selected, the next step was to develop a name for the mobile service. It so happens that the University of South Florida's mascot is the Bull. Ellis and Akin were immediately inspired and quickly came up with the very appropriate title MoBull Messenger. Thus, the wireless coupon and information service was born.

Everybody Wins

Since launching the program this spring, almost 2,000 students have signed up for the service, while 46 retailers are participating—including restaurants, clothing stores, bike shops, nightclubs, and hair salons. And these retailers are exactly the type of vendors the students want to hear from, according to USF freshman and MoBull subscriber Amanda Baker. "When I first heard about this free program, I thought it was a great way to save money and to stay in touch with what was happening around campus because I always have my cell phone with me, as do all my friends," said Baker. "Being a college student, I love getting all these discounts, and I know my friends do too. Just last week I received a MoBull Message coupon for 50 percent off a haircut and a contest call-in to win free concert tickets. It was awesome."

Michele Joel, USF's IT marketing manager, exclaims, "Since launching the fall 2002 marketing campaign, the user base has increased over 60 percent in one month. We have been having numerous promotions around campus to inform students, faculty, and staff about this free service."

Not only are the students reaping big results, but so are the participating vendors. In addition to seeing up to a 10 percent return, the retailers are paying as little as 10 to 15 cents for a permissions-based marketing message.

"This is one of the more interesting wireless retail programs I have seen to date," said Jeff Roster, senior analyst, global industries—retail, Gartner Dataquest. "One of the key advantages of this wireless coupon program is that retailers don't have to make any investment in IT infrastructure to participate. The

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retailers simply pay a set charge for every coupon they send out." Roster is an independent analyst who studies the information technology being used in the retail space, and he is with one of the top analyst and research firms in the country.

"What we think is especially appealing about this advertising medium is that it gives retailers near real-time promotion, and it is perfect for vendors with 'perishables' such as food, concert seats, etc.," said Ellis.

When participating retailers were asked about MoBull Messenger, their enthusiasm was unanimous. "When USF first approached us about wireless coupons, we thought it was a such a creative idea and a fantastic way to reach the students," said Kelli Marak, manager of Banana Joe's /Margarita Mama's, a popular restaurant and bar for the college students in Tampa. "We've just started with the program, and are really excited about it. We had a very good response to our first coupon and are expecting more with subsequent offerings."

"The wireless coupons are great when you are having a slow day because they really help in boosting your traffic" said Brian Barry, owner of Tampa-based Hair Bandits. "We just sent out a coupon for 50% off any haircut, and in two days we had five new customers walk in and six potential customers call to inquire about our services. We were thrilled with the response, and we also found that with the hair salon business, the longer the

promotion was extended the better return we received."

How MoBull Messenger Was Developed

USF's IT department assigned two engineers to build the application, and spent only 2 1/2 to 3 months to design and implement it. Initially, USF's people attended a three-day Air2Web training class in which they learned how to use Air2Web's development tools, and then set to work. They used these tools and XML-based APIs to connect their application to Air2Web's platform. USF built its subscriber database using SQL and used ASP code for its Web pages. It specifically chose ASP code so that the system could be duplicated and run anywhere since one of USF's goals is to sell its application to other universities. When developing the database, USF collected the subscribers' age, zip code, and areas of interest in which they wanted to receive coupons and information—such as nightlife, restaurants, retailers, or campus events.

"We specifically wanted our subscribers to be able to receive what they wanted, when they wanted, and how they wanted it," said Akin. "Thus, subscribers not only have the ability to choose which areas they are interested in, but which vendors they want to hear from. Additionally, they can select a quiet period during the day when they will not receive any messages if they choose." When new retailers and vendors join the MoBull program, subscribers are notified via e-mail so they can go into their profile and add those vendors to their notification list if they desire.

How It Works

If a participating restaurant is having a slow night, the restaurant manager
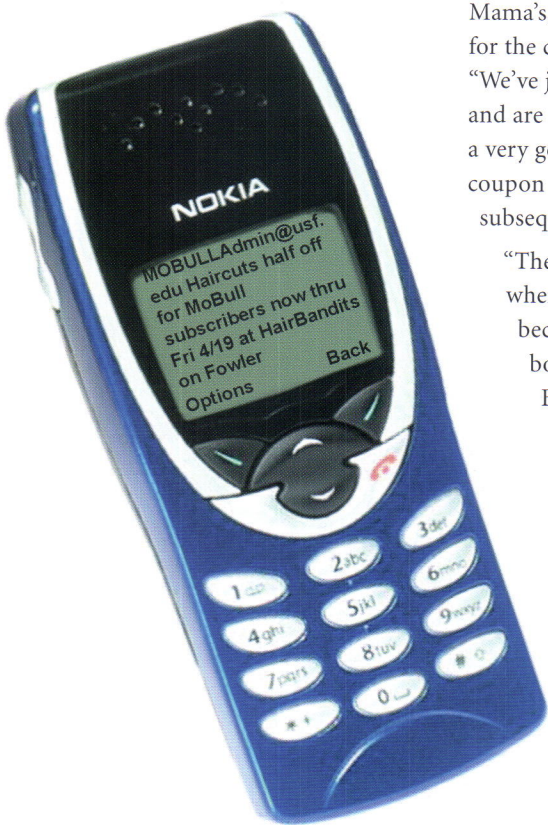
simply goes to the computer, logs on to www.mobull.usf.edu/messenger, enters the discount he wants to offer (such as $2 off any large pizza), selects the age of the students he wants to target (18–21, 22–25, all, etc.), their geographical location (all of greater Tampa area, northwest Tampa, etc.—subscribers' zip codes are matched up with the geographic areas), and then confirms the price per message, the number of messages being sent, and so on. The vendor's credit card is then charged the amount calculated, and the process of sending out the wireless discount coupon to students' cell phones, PDAs, or pagers begins.

Once the vendor sends out the wireless coupon via itscomputer, it immediately goes to USF's system. The system runs a query against the subscriber database, and all of the subscribers who fall into the vendor's parameters are pulled out. The database sends this list to Air2Web's Mobile Internet Platform in Atlanta. Air2Web's platform renders the message correctly out to all of the designated subscribers and their different devices. From start to finish, the process takes a matter of minutes.

According to Akin, USF took both a system analysis and a marketing approach when building MoBull Messenger so that it could continue to scale and support additional demographic areas, as well as message types. For example, currently MoBull Messenger is using only one-way SMS messaging. However, because of the Air2Web platform and the way USF has designed its wireless application, MoBull Messenger can also support two-way SMS capabilities. In the not-too-distant future, USF will add the ability for a student, who might have missed a coupon during the day because she had her device off, to go back and pull all the messages that were sent during that time. Potentially, the system could also allow students to pull up their grade postings using the two-way SMS functionality.

"We are very pleased with the response we've had to MoBull Messenger from both our students and our local retailers," said Ellis. "Considering that we just launched this program and our promotions, we are excited about the uptake. The MoBull Messenger Notification Service is an extremely valuable tool that is allowing us to seamlessly communicate with our students and staff while giving our local retailers a cost-effective medium for advertising. Lastly, it will generate revenue for the university. This is a win-win project."

Elizabeth Clarke is corporate communications manager at Air2Web. Reach Liz at elizabeth.clarke@air2web.com.

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Assistive Technologies Meet Students' Needs

by Kenneth L. Grisham

Over the last two years, we have started to see the coming of age of hardware and software that has become generally categorized as assistive technology. Historically, this definition has been closely and, unfortunately, almost exclusively associated with technology that is targeted to individuals who are challenged by visual or physical disabilities.

Certainly, the focus of assistive technology found its genesis in its use to address issues related to accessibility of systems, devices, information, and the like, per the Americans with Disabilities Act, Section 508. As the attention to overall accessibility is ratcheted up by federal and state government entities, assistive technology will continue to play a pivotal role in enabling vendors and customers alike to achieve the mandated objectives of Section 508. Given the integral responsibilities of educational institutions to establish special educational programs in support of disabled people, it is essential that those organizations be at the leading edge of deploying assistive technologies as they grow in complexity and expand their potential for application in society at large.

A plethora of promising opportunities are rapidly emerging for applications of assistive technology, particularly in areas such as learning disabilities (e.g., dyslexia), literacy, and English as a second language. Given that assistive technologies have been viewed as limited tools only for a small audience, it is not surprising that widespread deployment has been slow. However, when the larger opportunities are examined, it becomes readily apparent that, once again, institutions of higher learning may be the first to face the challenges of rapidly expanding penetration to much larger audiences.

Assistive Technology Goes Digital

Once again, tele-/data communications specialists will be faced with the age-old problem of ever-increasing demands for network bandwidth capacity. In the case of assistive technology, we foresee a potential explosion in the demand for access to text-based information that is converted to digital text and digital audio formats. Technology now exists to cleanly and efficiently convert material that originates as hardcopy into digital text/audio formats. OCR (optical character recognition) software has been around for a number of years. In and of itself, OCR represents only a piece of the overall bandwidth demand equation. The combination of maturing technology that combines OCR technology with conversion to digital text and digital audio files makes an attractive medium for use of information in an educational forum that heretofore has not existed. The hybrid of these technologies is now an enabler that truly bridges the gap between information on physical media (hardcopy) and effective, affordable digital media.

Broadening Adoption of New Assistive Technologies

The ease of creating digitized text/audio information is already manifesting itself on some campuses and in some school districts, where early adopters have embraced new technology not only for special education purposes but for expanded purposes well beyond traditional disabilities. We are now at a juncture in the evolution of assistive technology where the term *assistive* no longer only connotes disabled, but instead is beginning to shift to enhanced transfer of knowledge, regardless of audience.

While many educational institutions have made tremendous progress, a significant portion of information must still be imparted to a learner through physical media that require traditional reading of hardcopy. Early adopters are already demonstrating the efficacy of these new delivery mediums by putting entire lessons (sometimes entire semesters of lessons) into electronic formats for use by *all* of their students.

We must anticipate that this practice will grow in popularity with adoptions expanding rapidly over the next three to four years. Systems and network infrastructures must be ahead of the curve in anticipating and reacting to these emerging needs to move digital text and audio over both public and private networks. Of course, this means advanced network planning to accommodate activities such as installing or replacing cabling (wire and fiber), expanded use of wireless and satellite transmission capabilities, expanded pipes to Internet service providers, potentially expanded dial-up facilities (for those off-campus users without direct LAN/Internet access), and of course, all the related hubs, switches, routers, modems, and so on needed to connect and manage the data flow between all of these platforms.

Approaching Expansion of Assistive Technology on Campus

For a moment, let's transcend the traditional application of assistive technologies to a point where assistive technology is used in ever-widening circles. Imagine entire campuses (all classrooms) that are completely "accessible," not in the physical sense of wheelchair access, but in the digital sense where any and all students, faculty, and so on, regardless of their individual physical or cognitive abilities, can go up to *any* workstation on campus and be confident that it will be totally accessible. No more limitations to certain workstations in certain buildings at certain times of day or days of the week. This is certainly the theory behind the growing practice of "inclusion," whereby learners with special needs are placed in standard classrooms to learn alongside others.

Additionally, we must consider the impact that this may have on the growing number of satellite and extension programs with students attending classes online, thereby adding another dimension to bandwidth requirements for assistive technology. Assistive technologies such as hybrid scan/read/audio conversion tools now allow individuals to easily scan hardcopy material, convert it to digitized text using an OCR engine, followed by conversion to one of several optional high-fidelity audio formats (i.e., WAVE, MP3, GSM, VOX, etc.). These resulting audio formats (and associated digital text files) can then be downloaded to removable media or transmitted across networks. We already have students using new assistive technologies to capture text-based materials and download the digitized audio onto their MP3 players so they can listen to their

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New Assistive Technologies

New assistive technologies include software and hardware that enable users to perform many convenient as well as essential functions including the following:

- *Convert text documents to audio files* including making tapes of e-books. Voices provide clear, natural sounding audio. At least one of these programs (Text-to-Audio) can import Microsoft Word files for conversion plus display these files, formatting intact, and highlight the words as it reads.

- *Scan and read* by placing a book, magazine, or document on a flatbed scanner and pressing a key. Within a few seconds the document is read aloud, usually in the user's choice of voices. Some products include instant highlighting and support different languages.

- *Control a computer by voice—hands free.* Initial setup customizes the software to voice patterns and can be continuously improved as it is used.

- *Clone text* by using an OCR package designed to work with your screen reader. Some feature built-in spell checker, multiple document interface, and the option to retain document formatting.

- *Control a mouse pointer* by having the computer track your eyes.

- *Enlarge your screen.* Some programs include such features as advanced color smoothing for clearer images and reverse imaging.

- *Communicate in American sign language* via video-conference equipment to a sign language interpreter, who voices the signed message to a standard telephone user in spoken English. The interpreter then relays the voice message back to the caller using sign language.

- *Control the mouse cursor hands free* through the decoding of brain and facial muscle signals. The user wears a headband with sensors that detect electrical signals from the forehead.

- *Control the joystick-operated mouse by mouth.* Mouse-clicking commands are initiated by a sip-and-puff switch.

For an interesting look at what kinds of services can be offered, check out the Web site for the Public Library of Charlotte and Mecklenburg County, North Carolina. The library provides a host of sophisticated services, including a wide variety of assistive technologies (http://www.plcmc.lib.nc.us/libLoc/mainVirtualVillage.htm).

homework instead of just reading to themselves. Imagine how much data will need to move across networks if *all* students are expected to download digital text/audio files for all of their academic work.

We must all expect that both budgetary and legislative influences will bring growing pressures on all institutions to expand their inclusionary practices. This combination of inclusionary practices combined with the new generation of assistive technology will truly start to equalize the learning environment for all people with visual, physical, cognitive, and literacy challenges.

New Opportunities: Old Barriers

As mentioned before, assistive technologies are expanding their reach into other opportunity spaces. Tools that can serve individuals with more severe challenges can now also be applied to other, broader applications. New assistive tools, particularly talking word processors and hybrid scan/read/audio conversion tools, can be a wonderful aid to facilitating basic literacy.

According to the U.S. Department of Labor, more than 50 percent of all unemployed persons are functionally illiterate, and more than $5 billion is spent each year on public assistance to individuals who are unemployable due to illiteracy (Laubach Literacy Action). Also consider that English as a second language is now the single largest topical area being pursued in the adult education sector, driven by the 28.4 million foreign-born people living in the United States. (as of 2000 census). The old barrier of learning to read has always revolved around the human facilitation requirement—the fact that learning to read meant that another human had to sit with each student, reading and listening to him or her and providing feedback. New assistive technologies, while they will never totally replace human reading facilitators, can significantly extend the reach of those human facilitators by providing affordable tools that students can use independently in self-paced environments. This will represent a quantum leap for literacy movements worldwide.

New Opportunities: Lifestyle and Convenience

As of the 2000 U.S. census, there were 76.8 million people over the age of 50 in the United States. Unfortunately, as many of us have experienced firsthand, with age come many challenges—such as failing vision, decreased mobility, and impaired cognitive abilities—for which assistive technology will play an increasingly important role at home, on the job, and in an educational setting, where the demographics reflect a growing population of older learners.

Elimination of Price Barriers

Of course, the one (and maybe the most) important barrier to the proliferation of assistive technology is price.

Many of the various assistive technologies available today (particularly screen readers and stand-alone OCR packages) are premium priced, because the vendors feel that they are selling specialty products to a small niche market, thereby justifying higher prices. The cold, hard reality is that in spite of the sophistication or elegance of any assistive technology, if it's not affordable, then it's not accessible.

The most progressive vendors in the assistive technology space have already taken steps to make their products affordable (prices may vary as much as 80 percent) while still being powerful enough to perform all essential tasks. Drawing on our collective experiences from the hardware and software space over the years, when software packages, operating systems, and hardware platforms fall to certain price points, mass penetration quickly occurs.

Unquestionably, assistive technology is now starting to follow that same path. With mass affordability at hand, over the next two to three years, we should expect the corresponding mass adoptions in both public and private institutions, as well as by consumers. These mass adoptions will then fuel the corresponding demand for systems and network resources.

Summary

The world is starting to experience the convergence of efficacious assistive technology with prices that will enable it not only to be adopted by institutions, but to be easily adopted for individual use, too.

When it comes to lifestyle overall, we must also consider that people who have various visual, cognitive, and physical challenges continue to have those challenges *for their entire life.* Having assistive technology available in institutions is only part of the overall lifestyle equation. There simply must be a continuum of assistive technology that extends to personal life outside of institutional availability. Learning institutions are a cornerstone of this expansion of assistive technology in the communities they serve.

As with any technology that involves communication between two or more individuals, systems and network infrastructures are the glue that holds everything together. It is vitally important that professionals responsible for the design, development, maintenance, and support of those platforms be well informed of emerging technology changes in order to be an enabler, not a barrier, to the success of those whose needs are ultimately served by these technologies.

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Seven Characteristics of Good Customer Service

by Thomas D. Verlaan, CPM, APP

Telecommunications and information technology departments must interact with all constituents on a campus, from potential student to alumna, from lab assistant to tenured professor, from part-time clerk to president. On most campuses, every dorm room, workstation, office, and meeting room has both a telephone and a computer. Regardless of why all the people who use these devices are there, they have one thing in common: They are all our customers.

Because we support virtually every aspect of the work of the university, one effective measure of our success is the level of customer service we provide. Here are seven characteristics of high-quality customer service.

1. Recognizes its role in competing for students and employees. There is fierce competition for students among colleges and universities. Academic prestige and name recognition attract students, but the kind of customer service they receive once they make contact plays a large part in retention. Facilitating communication—which is the lifeblood of educational institutions—is our job, and we must not underestimate its importance in retaining students, faculty, and staff.

2. Creates a favorable first impression. Increasing numbers of students and parents choosing a college as well as administrators and professors looking for positions surf the Internet for potential campus choices and follow up with a phone call. So in a sense, both telecom and IT departments are responsible for first impressions. What people see and hear in that initial contact sets the stage for everything that follows. We have only one chance to make a first impression. Good customer service helps us make the most of it.

3. Regards problems as opportunities. Students and faculty spend hours every day using their computers for word processing, research, and more. They log on to the Internet or work at their own station. They may access library resources or exchange e-mail with other students or professors. Whatever they do, just as they expect water to come out of the faucet when they turn the handle, they expect access when they boot up their computer and dial tone when they pick up the telephone. Malfunctions and equipment problems are a part of life, so from call handling to response time to resolution, how we handle these problems can become a defining line. Attitude is everything.

4. Prioritizes for efficiency. Customer service doesn't focus just on problems or emergencies. Ideally, the majority of our transactions are for moves, add, and changes; requests for estimates; new service; and other routine exchanges. For many telecom and IT departments, these are revenue-generating orders, and paying customers should be handled in the same manner (or better) on a college campus as in the rest of the business world. Of course, you want to be sure your staff understands how emergencies are handled and can put a last-minute request that could help or hinder an important function ahead of more mundane tasks.

5. Keeps the customer informed. If you have established a mechanism for regularly updating your customers on time-consuming projects, they will understand when delays happen. Customers want to know that you are commiting a fair share of your resources to their problem and that their paperwork has not just been tossed into a bureaucratic black hole while they cope with inconvenience.

6. Follows up after the job. Follow-up is a simple but often neglected part of the customer service process. It can be effectively used as a barometer, a checks-and-balance system, or a quality assurance mechanism, and it may be the most reliable method to ensure that the customer did indeed receive the service he or she requested. Often, incomplete or unsatisfactory work will go unreported because the customer feels the issue is not important enough to be brought to the attention of a busy telecom or IT department. In many cases this leads to resentment and frustration and contributes unnecessarily to a negative perception of telecom or IT services.

7. Says "Thank you." From the most menial order to the highest-profile tasks, after the work has been totally completed to the customer's satisfaction, good customer service requires that we say "Thank you"— not just a parting word that gets you out the door, but a genuine expression of appreciation to a customer we value.

Most colleges and universities offer only one source for telecom and IT services. This translates to "no competition," effectively placing the entire campus at the mercy of relatively few people. We must remember that we are a support service, and it is in our best interest to strive for excellence in customer service.

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Autoattendant: Boon or Bane?

by Megan Statom

We've all dealt with it at some point: "For option A, please press 1. Using your keypad, please spell out the name of the person you wish to reach," and "Please stay on the line; your call is important to us."

We know it as the automated attendant—that professional, monotone, sometimes digitized voice that leads you through a series of menus in order to find the answer to your inquiry. It's there to help you, making sure you reach the correct person for your needs. It's also there to help the business you are trying to reach, by easing the strain on the staff. How does something that is supposed to be so helpful often turn out to be something so irritating? More important, if so many of us find them so irritating, are autoattendants really necessary?

> How does something that is supposed to be so helpful often turn out to be something so irritating? More important, if so many of us find them so irritating, are autoattendants really necessary?

Pros and Cons

Dwight Batey, telecommunications director at Valparaiso University, thinks they are. "We have more than 80 autoattendants. Each department or group that has an autoattendant can allow calls to come in without having to hire a full-time operator to answer the phones," he says. "Each autoattendant is set up to address that area's chief concerns. A classic example of this is the autoattendant for our athletics department. On one such device they can give out current events, directions, ticket info, and more. Another option simply lists names of professors that can be reached by depressing certain numbers on the keypad."

A major criticism is the lack of human contact involved in the autoattendant system. Ideally, a person on staff would be able to answer and direct all incoming phone calls correctly. "That is becoming less and less feasible," Batey argues. "These are difficult economic times, and it would be almost impossible to justify the cost of such persons. At Valpo, we have one switchboard operator working 8 a.m. to 5 p.m., Monday through Friday. However, when you ask her for a particular area, the number she transfers you to might be an autoattendant."

Not that Batey doesn't appreciate the value of human contact. "Although I am greatly in favor of human intervention, I can also see the need for something else, and that something else is the autoattendant. It works very well for us and continues to grow in number of users," he says. "It will never replace our switchboard operator, but it enhances her work."

Heather Howland, director of marketing at Phonetic Systems, Inc., seconds Batey's opinion. "I'm sure that most universities, given the opportunity and budget, would have a live operator or customer service agent answer 100 percent of all calls. Unfortunately, that just isn't realistic. Operators and customer service agents have a very high turnover rate, and the cost of maintaining a call center as service needs increase becomes very expensive. Salary, training, benefits, overtime costs, space, and equipment requirements add up to much more than universities can anticipate."

What's the Problem?

Some callers simply refuse to use automated attendant technology as it was intended. This can place more strain on the live operator than anticipated. "Studies show that nearly half of all callers 'zero out' to an operator when using DTMF (dual tone multifrequency, or touch-tone) based 'dial-by-name' solutions," says Howland. "A greater burden is placed upon operators to

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handle more calls than they were ever expected to manage. Added to the external calls being handled by the operators, there is an ever-increasing amount of internal calls—one staff member or student trying to reach another. No matter how many printed directories are distributed or how accurate the Web-based directory may be, it seems like the easiest path for callers to take is to hit zero and let the live attendant find the information they want."

Perhaps the key to the issue is realizing that this technology can't usually replace the switchboard operator or any other staff in departments that choose to use automated attendants. These systems should complement the human aspect, rather than serve as a substitute for it. Walt Magnussen, associate director of telecom at Texas A&M University, knows the frustrations involved in implementing such a system.

"We found that a couple of our departments weren't giving good customer service, and we felt that this problem was caused by the heavy workload members of their staffs were under," says Magnussen. After putting autoattendant-type technology in place on the assumption that it would relieve the workload and help workers deliver a higher level of customer service, it was determined that the problem hadn't been sufficiently remedied.

"The bottom line is, the problem was insufficient staffing, and that was the issue before and after the autoattendant was put to use," Magnussen states. "You have to identify and fix the real problem. We ended up with callers who were running around in circles only to reach someone who couldn't give them the help they needed in the first place. Trying to use inappropriate technology to correct our customer service problem did not help these departments."

Another problem Magnussen noted was the inconvenient manner in which the distribution trees were arranged within the automated systems. "The people who set up the call trees set them up in terms that they were familiar with," he explains. "When someone outside of the department or university called, what made sense to the person who set up the tree was actually more obscure for the caller."

Geoffrey Tritsch of Compass Consulting International, Inc., agrees. "Whenever you design a new autoattendant, be sure to have someone who is not involved with the function of the user department call in and work their way through the calling tree," he says. "Is it logical? Is it clear? Can you back up or go around again? What happens with an incorrect entry, wrong choice, or no choice? Scripting is the most critical aspect of any autoattendant design."
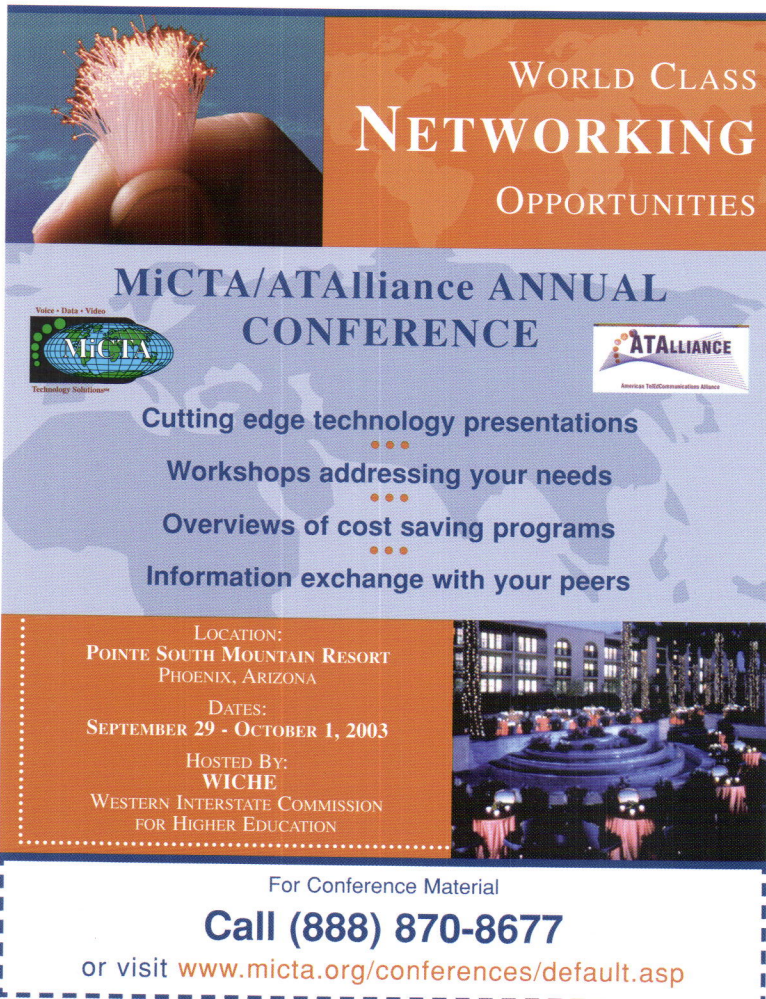
Benefits of Speech-Enabled Autoattendant Applications

Another option is using the newer automated attendant technology that is based on speech recognition. "The advent of speech technology has added a lot to user acceptance of automated systems," Howland explains. "Using a speech interface is more user friendly and faster, and has a much higher success rate than its DTMF predecessor."

Speaking to the autoattendant allows the caller to speak his or her request instead of having to push button after button in hopes of reaching the right person. This is especially beneficial in instances when the caller may be asked to spell a request. "You may be unsure of the exact spelling of a name," explains Howland. "With a touch-tone system, you would most likely be out of luck."

Stephane Couture of Locus Dialog suggests some additional benefits of speech-enabled autoattendant applications:

- Self-service information such as directions and schedules can be automatically provided via audiotex on a 24/7 basis. The speech attendant can also be configured with an organization-specific "persona" to maintain a consistent image.

- Having a speech autoattendant reduces on-hold times and zero-outs, and it reduces requirements for direct inward dialing (DID) lines.

- Based on the DNIS and CLID information available on some PBX platforms, the speech autoattendant can provide customized, department-specific greetings.

- It may also eliminate the need to print, publish, or post organization directories.

How Do You Make It Better?

Realistically, in today's economy, many schools and businesses will have to use automated attendant systems regardless of the arguments against them. What can you do to reduce the negative impact of these systems?

Janet Hutton, manager of voice processing at Princeton University, offers the following recommendations:

1. Have the main number dialed for the application exist in "software only" (i.e., do not have that line ring on a phone and then forward to the voicemail menu; it defeats the purpose).

2. Only provide "0" to an operator if the department can guarantee that an attendant is available. "Callers become continually frustrated if they press 0 only to reach another voice mailbox or a busy/unanswered phone," states Hutton. "It is also helpful to specify the hours an attendant will be available. Your message might say, for example, 'If you are calling between the hours of 8 a.m. and 5 p.m., you may press 0 to reach an operator.'"

3. Limit the number of initial menu options. Batey also feels that a limit should be enforced, "I strongly suggest that the menu be kept to three choices on the first level, and if it must have multiple levels to be kept to no more than two levels, three at the very most."

4. If possible, publish and post the menu options on quick reference cards, the Web, and so on. Callers will be less frustrated if they know in advance which option to choose.

5. If there are "listen only" mailboxes connected to the voice menu, you may want to designate someone to check regularly and ensure that the information is current. It is a negative reflection on the business if the information is out-of-date.

"The best policy," states Tritsch, "will require that any department go through the design and testing of the system to prevent the implementation of any autoattendant that reflects badly on the institution."

"We all know first impressions are critical," states Howland. "As a result, universities must be very concerned with the quality of service they provide to their callers."

Dwight Batey would probably agree. "I try to remember that the first contact some people might have with my institution is that first phone call," he says. "Whether consciously or unconsciously, the caller's impression of my institution will be partially based on the helpfulness and ease of that call."

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Hot Spots: Hot New Idea for Serving Customers and Generating Revenue?

by Gary Audin

The 802.11 Family

802.11 refers to a family of specifications developed by the IEEE for wireless LAN technology. 802.11 specifies an over-the-air interface between a wireless client and a base station or between two wireless clients. There are several specifications in the 802.11 family:

802.11 — applies to wireless LANs and provides 1 or 2 Mbps transmission in the 2.4 GHz band using either frequency hopping spread spectrum (FHSS) or direct sequence spread spectrum (DSSS).

802.11a — an extension to 802.11 that applies to wireless LANs and provides up to 54 Mbps in the 5GHz band. 802.11a uses an orthogonal frequency division multiplexing encoding scheme rather than FHSS or DSSS.

802.11b (also referred to as *802.11 High Rate* or *Wi-Fi*) — an extension to 802.11 that applies to wireless LANS and provides 11 Mbps transmission (with a fallback to 5.5, 2 and 1 Mbps) in the 2.4 GHz band. 802.11b uses only DSSS. 802.11b was a 1999 ratification to the original 802.11 standard, allowing wireless functionality comparable to Ethernet.

802.11g — applies to wireless LANs and provides 20+ Mbps in the 2.4 GHz band.

Source: http://80211-planet.webopedia.com/TERM/8/802_11.html

If you're looking for a hot new idea that will generate customer satisfaction as well as revenue, you may be looking for a Hot Spot. Wireless ISPs or WISPs—also called Hot Spots—are coming to a crowded corner near you. Starbucks offers more than 350 locations. Wayport, a WISP vendor, serves 450 hotels and nine airports. Soon WISPs will be found in train stations, hotels, restaurants, stores, stadiums, and conference centers.

A Hot Spot is a limited-distance wireless LAN (WLAN) with public access using IEEE 802.11 standard technology. Access can be accomplished from laptops, notebooks, pocket PCs and, eventually, PDAs at megabit speed. A Hot Spot can provide full access to the Internet and the user's personal networks without providing access to the campus network. It can also be a revenue producer for colleges and universities with sites at fraternity and sorority houses, off-campus residences, libraries, eateries, and cafes—wherever students congregate.

Hot Spot Services

What you can do over an 802.11 LAN will depend on the device used to access the LAN. Laptops, notebooks, and pocket PCs are the likely initial candidates. Services can include the capability to:

- Access e-mail or perform instant messaging
- Register online or participate in online classes
- Submit class assignments or correspond with professors
- Access databases, libraries, the Internet, or student chat
- Make voice-over-IP calls
- Download music/entertainment or receive streaming video

Educational institution users will probably go beyond corporate user applications. Students will invent uses rapidly and will expand upon the list.

Vendors Move Forward

The IEEE 802.11 standard comes in different flavors. (See sidebar.) At present, the IEEE 802.11b standard enjoys the most sales and is supported by many vendors such as Cisco, Proxim, Nortel, Aironet, Avaya, and Symbol. The newer 802.11a and pending 802.11g technologies will be replacing the slower 802.11b products rapidly. The primary concern with 802.11a is the cost of network interface cards/access points and the lack of interoperability with 802.11b devices. Intel will introduce new low-power consumption chips for combined 802.11a/b operation soon. Microsoft is going to integrate its .NET Internet appliance strategy with Hot Spot networks.

Already a national conference called the Wireless Hot Spots Conference and Expo has convened, in San Jose in September 2002. Enough interest has been generated to stimulate the creation of the Open Mobile Alliance (OMA), an organization of approximately 200 companies that will set standards for wireless communications.

The cost of adding WLAN as an integrated part of a new laptop is about $50. Adding a wireless card to an existing laptop costs about $200. Both prices are steadily falling. Seven million 802.11 cards were sold in 2001.

At What Price?

There is no historical precedence for pricing Hot Spot services. There are two schools of thought: measured usage (per access) or a flat monthly fee. Starbucks has begun by offering two plans: 20¢ per minute or $15.95 per month. T-Mobile has several plans ranging from $2.55 for usage service to $29.99 per month for unlimited local use or $49.99 per month for unlimited national use. Success in the corporate world appears to favor fixed low pricing. Charging for off-campus access could be a combination of a connection or bandwidth (T1, T3, 10/100 Mbps) charge plus a charge for each access point rather than a charge per user. This appears to be better suited for the university access charges.

There are several operating Hot Spot services. It is worthwhile to access their Web sites to learn their pricing structures. Five of these sites are:

1. Airpath Wireless (http://www.signup.airpath.com/portal/getservice.asp)
2. Boingo (http://www2.boingo.com/whatdoesitcost.html)
3. Surf and Sip (http://surfandsip.com/sign_up.htm)
4. T-Mobile (the largest so far) (http://www.accounts.hotspot.t-mobile.com/services_plans.htm)
5. Wayport (wayport.net/chart)

Getting from Here to There

Connecting to the off-campus building can be the most expensive part of the network. Traditional T1 circuits can do the job but may cost $500 to $700 per month after installation. Educational discounts will help defray these costs. A T1 or fractional T1 at 768 Bps is the minimum access speed. SDSL and HDSL service at half- and full-T1 speed may also be available. Although it is less common today, you may be able to lease a metallic (or unloaded) copper circuit from your local carrier. Some short-haul modems that operate at T1 or greater speed over this circuit could significantly reduce the carrier's charges.

There are a number of new wireless choices that can be used to connect to the remote sites. Western Multiplex

Figure 1: Wireless products

PRODUCT	SPEED	DISTANCE
Tracer by Adtran	2xT1	30 miles
Cisco WT-2710	T1, T3, 10BASE-T	20 miles
Speedcom SC5800	T1, 10BASE-T	25 miles
Proxim DS-3	T1, T3	5 miles

produces a wireless (microwave) product that can support 100 Mbps Ethernet transmission up to five miles. It can operate for greater distances but the speed will be reduced. It operates in an unlicensed frequency range; therefore FCC approval is not required.

Four other companies—Adtran, Cisco, Speedcom, and Proxim—have introduced similar products that also operate at unlicensed frequencies. They all require line-of-sight transmission and support full-duplex operation. (See Figure 1.)

Actelis Networks has announced an unusual product, the Meta Light 1500, that works over multiple carrier-

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grade copper pairs and can support up to 50 Mbps using four to 20 pairs at 18,000 feet. It looks very attractive for 10 Mbps Ethernet access.

A good reference for wireless point-to-point links is found at http://www.nwc.com/shared/printArticle. jhtml?article=/1318/1318ws.

Implementing the Remote Site

There will be multiple access points per site, connected together with a LAN switch at each site. The LAN switch resident at the remote site should provide in-line power to the access point. The power is produced by the LAN switch and carried over the data cable (category 3/5). There is an IEEE 802.3af standard pending for in-line power, or so-called Power Source Equipment (PSE). Power can be delivered over an unused pair (called midspan PSE) or over the data pairs (called end-point PSE). Most larger and sophisticated LAN switches can be PSE. The cheap LAN switches will require a separate power bar, such as PowerDsine's product, to power the access points. In either case, this eliminates the $200 to $400 required to pay an electrician to install power to each access point.

Network management will be a major issue. Access points and LAN switches will have to be remotely managed. This increases the capital cost but can reduce labor costs in the long run. Selecting the products that can operate with a common management platform will take time and limit the number of vendors. Cheap LAN switches and access points have little or no remote management capabilities. A separate management station with staff trained in WLAN technology will probably be required.

It's Not All Perfect

How well Hot Spots perform will depend on several factors:

1. Whether 802.11b (up to 11 Mbps) or 802.11a (up to 54 Mbps) is used
2. The antenna type used: Rubber DiPole, Ceiling Mount, Ceiling Mount High Gain, Patch Wall, Pillar Mount, Ground Plane
3. Antenna distribution and placement
4. Distance from the antenna (access point or AP)
5. Number of simultaneous users
6. The bandwidth used from the remote facility to the university campus
7. The materials in the room

Even if everything is done properly, users will experience slower transfer speeds than they would with a wired LAN connection. Distance plays an important role. The highest speed available for 802.11b in an open room (no walls) is 11 Mbps at 100 to 150 feet. As distance increases (150 to 250 feet), the speed reduces by half to 5.5 Mbps. And at 250 to 350 feet, it decreases to 2 Mbps. If users

choose to work outdoors, then walls will become involved and the speed could be as low as 1 Mbps.

Access point (antenna) locations will have to be selected and probably changed to ensure there are no blackout areas in a room. Line-of-sight may be achieved, but multipath (reflected) signals from walls, ceilings, or other obstructions may cancel out the signal.

The WLAN may not be as reliable as the wired LAN. Access points may lock up causing a manual or automatic restart when overloaded by too many users. The WLAN access card may have to be restarted in the laptop. Finally, the laptop may have to be rebooted.

Notes from the Field

The first installation should be small, as a learning experience. This is a radio environment; therefore you will probably have had less experience. A resource for learning more about this environment would be schools for the deaf. They have been using radio-looped classrooms for years. Also, the physical buildings and their construction materials will vary. Adjacent buildings with Hot Spots may interfere with each other, so the channel selections for the access points will have to be coordinated to eliminate contention. It takes time to locate, and possibly relocate, access points and to fine-tune them.

There are several other considerations:

1. Use only proven standard-based products to avoid interoperability problems between access points and access devices such as laptops.
2. Always perform a site survey first.
3. Remember that access points can point vertically, horizontally, in 180 degrees and 360 degrees.
4. Laptop battery life can be cut in half with a WLAN card.
5. Co-located access points should be separated by three to five channels when installed.
6. The maximum number of users per access point should be limited to 15 to 20.

If you want to sell this service, you must announce it, demonstrate it, and then have enough product to install it quickly.

Organizations with useful information include:

- IEEE Wireless Standards (802.11)
- Wireless LAN Association (WLANA)
- Wireless LAN Interoperability Forum (WIF)
- University of New Hampshire Interoperability Laboratory

Gary Audin is president of Delphi, Inc., a consulting firm out of Arlington, Virginia. A familiar face to ACUTA, he has spoken at numerous ACUTA events, including the annual conference in Reno this past July. Reach Gary at delphi-inc@att.net or 973/492-5655.

Interview

Lee T. Todd Jr., PhD

President, University of Kentucky

Lee Todd officially began his term as UK's 11th president on July 1, 2001. Prior to his UK presidency, Dr. Todd was senior vice president of Lotus Development.

Dr. Todd received his B.S.E.E. from the University of Kentucky and his Masters and PhD degrees in electrical engineering from the MIT. While a graduate student at MIT, he received six U.S. patents in the area of high-resolution display technology. It was during that time that he began proposing the application of telecommunications and high-resolution displays for data conferencing.

Dr. Todd founded Projectron, Inc., in 1981, and incorporated DataBeam Corporation in 1976. DataBeam has been the world's leading provider of real-time collaboration and real-time distant learning software and development platforms.

He formerly served on the Kentucky Council on Postsecondary Education and chaired the Distant Learning Advisory Committee that is responsible for the development of the Kentucky Commonwealth Virtual University and the Commonwealth Virtual Library.

Ron Kovac, PhD, is a professor in the CICS program at Ball State University. He has presented at many ACUTA events on subjects as varied as unified messaging, wireless LANS, and security. His focus and areas of interest include distance learning and internetworking. Ron also serves on ACUTA's Publications Committee.

Kovac: Business intelligence and strategic visioning continue to evolve as the new mantra in today's competitive environment as a process and tool to see where an organization has been, where it stands, and where it can go. How is strategic visioning being used to formulate strategy at the University of Kentucky and other colleges and universities? How do you formulate technology-enabled strategies to communicate and differentiate academic and business value in a campus environment?

Todd: I left my job at IBM three months early so I could be on campus to talk with the faculty and staff about a common vision. On July 5 [2001], my fifth day in office, I shared a vision that the University of Kentucky's campus should be the entire commonwealth of Kentucky because we are a land grant institution. So I had that vision. The university is mandated by the state to become a top-20 university by the year 2020. The legislature granted some "bucks for brains" money, as we call it, $67 million two sessions in a row, and we've got another one coming whenever we pass the budget. If we match that money, we can use it for endowed professorships and graduate fellowships to expand our research agenda. We've created 150 endowed positions at this point in time thanks to that legislative support.

My challenge was to figure out what this top-20 goal meant, because too many people were ascribing that to just research dollars. Let's climb the ladder, let's knock out the number 20 person on the list, and let's become a top-20 research university. I took the position during my interviews for this job that that wasn't enough. We could accomplish all our strategies toward improving our research, but we could fail the state of Kentucky. If you just base your strategy on research dollars, you leave out the arts, leave out the law school, you leave out business and the liberal arts, and that wasn't what I thought the legislators meant.

My contribution to this vision is that we must drive our research agenda with strategic planning. I declared peace with the University of Louisville because it used to be a combative,

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competitive relationship. We've jointly opened an office in Washington, D.C., along with the governor, and hired a lobbying firm to help us look for funding sources in the D.C. area. So when you align some of our strategies with the goal of driving our research dollars, the result was $212 million in research funding this year, which is up 22 percent from last year and the largest total in the university's history. I feel good about that.

I came up with what I call our higher-purpose mission, and that is to solve problems that have eaten away at Kentucky for many years. I refer to them as the Kentucky uglies. One thing I've found is that when it comes to vision, you've got to give people word hooks that they will remember and think about. I make the point that we're the leaders in diabetes, the leaders in lung cancer, and the leaders in the birth defect spina bifida. We are not the leaders in literacy, and we're not the leaders in the economy.

So I put a committee together called our "Top 20 Committee," and I asked them to determine how we will measure ourselves. The committee developed parameters to compare us with our peers around the country—things like our research funding, our endowments, our faculty awards, our student awards, and other types of measurements that can't be doubted. They're quantifiable. Other institutions give us their numbers and we see where we stand. We're going to do that.

In addition the committee defined what they call their commonwealth measures. These are going to be the things that we're actually going to discuss with the public. We're going to take the competitive juices of Kentuckians—the same spirit we show in our sports arenas—and say we're going to whip some of those problems that make us look bad. We have chosen those specifically; we have people working on them. As an example, we

can choose to get off the top-10 list of diabetes, and let's use some of our best researchers to work on that problem. Let's use our communications and our educational skills to work on that problem.

From my business experiences, when I looked at the Cooperative Extension network, Ag Extension, I saw employees in all 120 counties of Kentucky. I look at that as a sales distribution channel. It can sell the results of our research here at UK to our population. Those are trusted salespeople; they are ambassadors out there known by everyone in the county. We actually already had some funding, so we implemented some of that vision. Senator Mitch McConnell helped UK obtain an $800,000 grant to form what we call the Health Education Through Extension Leadership program. Our School of Public Health takes data from our new research efforts, and let's say it's in diabetes for instance, and communicates that to our extension agents who then communicate it to the population of Kentucky. Part of this higher-purpose vision is to choose some measures that are specific to Kentucky; we are the University of Kentucky, we should be solving some of the problems that are in Kentucky. That's part of our vision and has become part of our plan.

I also had a Futures Committee formed for this vision to decide our areas of focus. These are areas where we are on the verge of excellence. For example, our opera program is very strong, and in healthcare—cancer, neurosciences, and cardiac care—these are our strong areas, so we've actually focused on those, and we're going to have to invest in those differentially to make them better. I've had those task forces out there working.

The other piece of this visioning and strategy for Kentucky that's unique is that with House Bill 1 that Governor Patton put in place, the

Council on Postsecondary Education was formed to set an agenda for higher education. I served on that council from its beginning, until I took this position at UK. They selected benchmarks for each college and university in Kentucky. All of the universities have different benchmarks. The comprehensive universities have different ones. The University of Louisville has different ones because it's an urban university. UK has different ones because we are a land grant university. We actually have 19 benchmarks.

That, to me, is a great way to do it because it lets us tell our legislators, if they expect us to be a top-20 institution, this is what our benchmarks do—these are the salaries they pay, these are the tuitions they charge, and so on. We can then turn to our faculty and say in the top 20 universities this is the research productivity per faculty member. For an analytical way to guide yourself, the benchmarking process I think was very important here in Kentucky. I use it on a regular basis to decide how to talk to our faculty and our legislators about what we should be doing to look at the best practices out there.

If I could talk some about the technology that I'm using to push this strategy, one of the clear things that I've always believed is that communication is really your most important vehicle, and I do use e-mail significantly. I probably get 75 to 100 a day and deal with many of them myself. What I've found interesting is that while we've been going through this visioning process, I broadcast e-mails out to the faculty and staff to give them updates on where we are in the process.

We had a major healthcare benefits problem at the university because of the way healthcare costs were going up and the fact that we weren't paying much for a family's health insurance.

As a matter of fact, we were paying 32 percent while our benchmarks were paying 89 percent. That hadn't really been disclosed to our faculty and staff before. I put a healthcare task force together, and they came back to me with those percentages. So we put that information on the Web. We had a Web site that tracked every meeting that task force had. It's what I call transparency. You use technology to create transparency. You let the people know how you're getting to a decision by providing the intermediate information to them. We finally came down to their recommendations, and I decided what I was going to implement. We are now paying 54 percent of the healthcare cost for our families because I made it a real priority to solve that problem. When I sent that e-mail out one night to faculty and staff, and we've got about 12,000 faculty and staff, the first reply that I got was from a staff member who just thanked me

for the communications process. He didn't thank me for the money; he just thanked me for staying in touch with the employees and letting them know how I made the decision and what actions I was taking. So I think that as you try to move any organization forward, openness and the use of technology to create that openness is very important.

The other thing I've done to try to encourage this vision is the use of videoconferencing. For example, I went over to the medical center last week to welcome the new residents to our medical center. When I got there, the room was packed, and we had a video connection to the Center for Rural Health in Hazard, Kentucky, in the Appalachian region of our state to the east of Lexington and to our clinic in western Kentucky. Not only was I there to welcome people from one end of the state to the other, but we also had presenters, one from Hazard and

one from Lexington, to talk about what I call the Kentucky uglies. So their program was based on determining the things that we can clearly measure that we think we can impact and the actions we are going to take to achieve our goals.

Kentucky is pretty well wired as a state. We have a lot of video teleconferencing sites (300+) around the state. So we had presentations from remote sites that were broadcast to everybody. There may have been more than two sites on at a time because we can tie in quite a few. It's important to have a strategic plan, but if you don't communicate it, answer questions about it, and get people to start talking about it for you, then you're not going to be successful. I have found that the videoconferencing links are helpful.

I have spoken to over 7,000 high school students since I've been at this job, and I was asked to speak to a group in Appalachia. Our congress-

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man Hal Rogers has started a program called Roger's Scholars for kids in Appalachian counties to learn entrepreneurship. It's a two-and-a-half-hour drive there and back. I went to our Center for Advanced Manufacturing, cranked up their video teleconferencing facility and connected to the video teleconferencing room at a center in Somerset, and I just talked to the kids using that technology. I'm very comfortable with that approach.

The last thing I'll mention about technology on our campus is that we're wired pretty thoroughly. We've got a lot of wireless around the

campus. We've put in a cyber Starbucks cafe in our student center. The whole student center is wireless, so students can go in and check out laptops and sit wherever they want to in the student center to check their e-mail or work on their term papers or whatever they want to do. Our outdoor areas around the dorms and central part of campus are wireless as well. It hasn't caught on as fast as I'd like for it to there, but it has at the student center. I'd like to see kids collaborating sitting under the trees and surfing the Net and things like that. We've actually run power out to

some of the areas so they can keep their batteries charged.

Two weeks before I took office our administration building burned. We're planning to rebuild it. But at this time, we've got administrators strung out all over campus. We're using Lotus Sametime Connect instant messaging. It has application sharing, and it also has IP audio/video built in as well. It's got what I call business-quality instant messaging, and we are using it internally right now within my administrative staff. Right now while I'm sitting here talking to you, Linda can pop up messages to tell me that someone's sitting outside, or I need to sign something or whatever. You don't have to use the phone as much. You find people, and you get things done much faster.

Kovac: What are you seeing as new and emerging technologies? How are you incorporating them within the university environment?

Todd: There's more, to just get away from the strategic piece of it. Just getting campuswide calendaring is important. We were so used to it at Data Beam. Here on campus, there were just pockets of people on calendar systems. Judy, my secretary who's been with me for 15 years, will call someone and say that she's going to schedule a meeting with the president and asks if she can just send an invite and they're like, "What do you mean?" And she says, "Oh, you don't have calendaring?" And next thing you know, they have calendaring. It's growing. We'd like to get the students tied into that system, too. They're not yet, but that is part of our technology plan. We want to put as much information on the network as we can about schedules and classes. They do now e-mail their professors a lot—that's already happening. But just having the uniform calendars across the university is important.

Kovac: Standards are a critical part of any strategic direction.

Todd: I agree, standards are very important. The way that Data Beam really got a break was when we applied for the Star Wars contract. We had never shipped a product before. But I went to the NSA [National Security Agency]and other government people making decisions and told them that we were going to publish our protocol and that we were going to do data conferencing so they could transmit documents and interact on them and so forth. At that time Compression Labs was the only video vendor out there. PictureTel was trying to break in, but CLI had a proprietary standard, and if people wanted to talk to a military video teleconferencing facility they had to buy CLI. I knew the government didn't like it. So I kind of got my best break with the Star Wars contract. We delivered the first product that Data Beam ever made to the Star Wars contract without ever having had another sale. That was our very first sale. It was largely because we were saying we were going to develop a standard. They then invited us to chair the T120 Committee at the CCITT [International Telephone and Telegraph Consultative Committee], which is the ITU [International Telecommunication Union] now. I believe strongly in standards. With instant messaging, the Lotus product can actually talk to AOL's product; at least they could when I was still there, because they both used the same protocol. It's just so much more powerful when everyone uses the same standard. That's a big issue with me.

We're doing a new ERP [enterprise resource planning] system. I've hired a consulting firm for that project. When they tried to do it here some years ago it got to be very personal and somewhat political. They finally just ended up backing off and didn't do anything. We really need much, much stronger administrative computing. I'm a data

hound. I like to see data. I reconstituted our institutional effectiveness office at UK because you've got to measure yourself. If you don't, then you won't make improvements. We're looking at an ERP purchase now. There are so many horror stories out there from the early days, so I needed someone as a third party to come in. This is part of my strategy in making this decision. I needed an independent third party to cut through all the stories that were just flying all over campus about the different potential implementations, so they could give us professional answers and not emotional answers. They're doing their work right now. I have a campuswide committee that I put together to make sure we know all the input we need, from student records to all the other issues we have on campus that we need to take care of. So we're in the middle of that. I'm going to be looking very heavily at standards because if you are

roped into one vendor, then any expansion or modifications you want to make can only be supplied by the proprietary vendor and you cannot control cost. Additionally, standards are very important, they allow the customer to participate in setting directions.

In our medical center, we're spending about $70 million to put in a system we are purchasing from Eclipses. It's really an information management, patient electronic records system. We're calling it ISIS. It's a way for the doctors to enter their data and information in a much more systematic way. With all the HIPAA [Health Insurance Portability and Accountability Act] regulations, they're going to be broad based. We had the actor Jason Priestly in our hospital after his car wreck this summer, and our Web site had
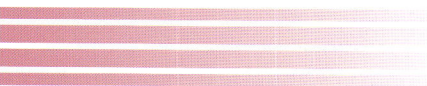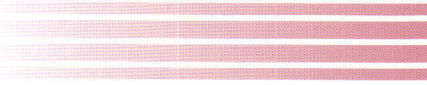
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> It's important to have a strategic plan, but if you don't communicate it, answer questions about it, and get people to start talking about it for you, then you're not going to be successful.

updates on Jason Priestley's condition. Well, in a few months you won't be able to do that; it will be prohibited. You really have to be able to maintain medical records and assure privacy. Again, as we go through that system and we're putting some of our own development into that, I'm trying to ensure that we don't get locked in and that we can at least have document standards so that we can interchange documents with other providers.

I know how you can play the nonstandard game and survive. It's interesting in our case. When we were developing the so-called T120 protocol, we had a product called Farsight, which we sold for about $100. It used the standard protocol. Microsoft called and wanted to license the protocol. We knew that when they did license it, they would give away a product very similar to Farsight, which they did. Their NetMeeting basically does what our Farsight product did. But we also knew that if Microsoft didn't adopt the T120 standard, then it wasn't going to be implemented throughout the industry. So we licensed them, and they were very kind. We had about 10 press conferences, and they really supported the press conferences and getting the word

out. That helped us sell the infrastructure people and other people that technology because they knew that Microsoft was going to put it in their operating system, and they needed to support it. But it kind of shot down our Farsight product. We had a net server called the Net120 server, which eventually was changed to Meeting Server, and we knew we had to move quickly because if that standard got out there and everybody could do it, then we had to have another product that could hook on that standard. So it puts a lot of pressure on [standards-based] vendors to stay ahead with innovation because they can't maintain product development cycles or have the total product control they had when products were based on their proprietary standard. Their innovation cycle has to go faster, so I believe a lot in openness and standards.

Kovac: Dr. Todd, you mentioned learning and distance learning. How did you assess the readiness of UK to support this distance-learning structure? What do you consider to be the top challenges and issues in this field?

Todd: I chaired the Distance Learning Advisory Committee in Kentucky that formed the virtual university for the state, the Kentucky Commonwealth Virtual University. The last time I checked we had more than 4,000 students on that network. I chaired it before I ever thought I'd have this position. But if you want to get any input on that, Daniel Rabuzzi at the CP office in Frankfort is a good source. That's going awfully well. It grew very quickly. What I found when I was on that committee, which is made up of all the university presidents, is that this is not a technology issue. There are so many policy issues that you run into with distance learning at universities, such as who gets the tuition dollars, how do you charge—per course or a flat fee—and what about intellectual property.

To me, there are two limitations to the spread of distance learning. One is

the policies that need to be developed so that people can clearly know how to charge for it, how to make money from it, and how to protect the intellectual property. The other is just a behavioral change. What we found is that the people who were placebound, such as a librarian who had to be in a library every day in a small rural setting, could never come back to the university and get a master's degree, but they could certainly click online and take Web-based courses. So the people who had no other choice were your early adopters. Trying to get the faculty to change their courses and put together courses for e-learning was a bit of a stumbling block here at UK and throughout the state. To entice them, we put in some grant proposals and encouraged faculty to come together from different universities to form courses that we offered throughout the state, but we gave grants in order to initiate course development and get courses on the network earlier. It does take time to develop e-learning courses—it's almost like writing a textbook—so we thought that we had to give that incentive.

One thing I'd say about standards, I also chaired the committee that put in the virtual library for the state of Kentucky, and the librarians had already advanced quite a bit, so we did what I call financially induced cooperation. A lady named Miko Pattie is the head of the Kentucky Virtual Library, and we just basically said that this is the library software we're going to go with, and anybody who wants to go to the Virtual Library should have the same experience no matter where they are in the state or what institution they're with. Then, we said that we've got the money to buy this for you. If you want to do something else, that's fine, but we're not going to pay for it. There are drivers. These are the nontechnology things you have to do to get adoption. One of the big assets, the access we've had to databases and articles for rural libraries, and the

things that they can get now that they could never have afforded in the past, has really been super.

We have the number one endowment for a public library in the United States. Our William T. Young Library has about a $70 million endowment, second only to Harvard. When we buy databases for the library, we make them accessible to everybody in the state. When I looked around, the state of Kentucky was pretty well braced for two-way availability from an infrastructure point of view. During the Governor Jones administration, we put in a backbone network, and we wrote a job description for the chief technology officer for the state. We were pretty well positioned for two-way video, and we do quite a bit of that in the medical center and between institutions in this state. We don't do as much Web-based work as I want to. In my first year at UK I have not been as involved in that, but I do plan to become more involved in my second year. I think people felt, with me being an engineer and coming out of the software business, that I'd spend a lot of time dealing with things that were technical, but I just didn't my first year. I do intend to do a review of our distance-learning program. What I think I will find is that it's not the technology—again we're a pretty wired campus and we have access to bandwidth throughout the state—but our shortcoming is in our aggressiveness to put online courses together. Some are doing it, but we're not doing it in the unified way I'd like to see in the future.

Kovac: Do you see that as a bigger service to Kentucky residents or nationally?

Todd: I think it's national. When I interviewed, one of the faculty asked me, "How do you think your business background is going to help you be president of UK?" And I have to tell you that some of the faculty were not thrilled with that concept, one, with an engineer being president and, secondly, with an engineer from business, even though I had taught here for nine years. I was on the faculty here and had tenure when I was younger.

My comment to them was that I think one place where my business background will help me is that I think higher education is the next industry to be deregulated. And it's going to be deregulated based on technology and telecommunications. Stanford could offer a free MBA in our backyard for a year if they wanted to just get market share, and that's pretty attractive.

So what we've got to do as an institution is identify our strongest strengths, find what we have that is appealing to people throughout the world, and offer it. We need to be positioned to be able to offer those courses at a distance to a population who will come to us because we have the expertise in that field. So I think that part of our obligation initially is to give access to

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education to our residents who are placebound in the state, but at the same time our audience can be far flung. I know we've done some work in the past with Kuwait through our dental program. We've actually flown some faculty members over there; we're doing some now in Dubai with the business college. And in each of the cases where we have a relationship, we should have a strong distance-learning component that we can offer on a regular basis. I think that's where universities are different. In the past we were kind of a regulated environment—we controlled our area, and people had to come to us. But just like telecommunications tore down the Berlin Wall, it also tore down that fence that used to protect us. Now, we have to go wider to bring in the customers.

Distance learning not only plays a key role in the courses you sell or whatever, it's the uniqueness that you can bring into a classroom. So we've got smart classrooms on campus that are wired like many universities do, and you can bring in guest speakers such as John Chambers or Bill Gates to talk to your class. I think that technology broadens the educational field, not just in selling the distant classes but also from enriching that experience inside the classroom.

Kovac: Regarding e-commerce and its projected rise in corporate America, do you see that same impact on higher education with e-commerce? You're not selling just the courses, but you're selling your other strengths whether that be library resources, smart classrooms, and so on.

Todd: We are not as advanced in e-commerce as we could be. I think the healthcare industry is where the service has grown. Student-based population could certainly benefit by allowing people to pay electronically, to look at their healthcare electronically, and to deal with all their internal

bills for employees. I'd like to see us get onto an electronic travel system within this university. We still fill out paper. When I was at IBM we had, you might not call it e-commerce because it was for internal use, but it was a commerce-based application. I think that's going to be the natural evolution so people can come to you and do everything electronically. Some universities are doing that now. It's a natural move as you get away from the paper process, but we have not been as involved in it yet as we will be.

Kovac: Security always becomes a big issue with universities, that they're doing a balancing act. They want to be free and open with information, but there are also regulations. How do you handle security issues? Do you farm them out or do you take care of them internally?

Todd: We take care of it internally right now, and I know this whole "hosted service business" is picking up. Of course IBM has recognized this. IBM is offering managed security services from its Global Services Division. Other managed services companies like WebX offer applications to individual users from their location (ASP). I looked at putting in a hosted service for Lotus's collaboration products where we let people use the application on Lotus servers managed by Lotus personnel; we'd host the meetings. I do know companies are hosting people's software. That whole ASP market is going to happen, but it sure was slow to get going. And I think some of it was a concern about security. We haven't taken that step outward. We would probably evolve some processes that we will outsource in the lower-risk applications. Again, just in running an institution of this magnitude, if you can outsource a capability and get it done effectively with security and at a low price, then that's going to happen. That's just a natural piece that's going to move

forward. I haven't tracked the ASP market previously.

At Lotus, we did a packaging to provide our products to ASPs so that they would take them on and start to sell them for us. It was slower to take off than any of us wanted it to be. We were relying on them to provide the secure links. There's big business in that, so that will happen. There's a general caution, I think, on all fronts to turn it over to somebody until you test it with some kind of starter area and then see how that works and then sort of let more of it go. That's one of the things that was beneficial about being associated when IBM acquired my small company. We were selling conferencing products that allowed you to share data over the Internet, and people were somewhat skeptical about whether they wanted to do it or not. Just having the power of an IBM behind you who could take their global services and put you on secure networks and do some of those things helped us sell products to corporations that just wouldn't buy from us before. Security is a big issue. It will happen.

We talked to quite a few companies who were very interested in outsourcing their whole network, everything. They got down to the point where they were talking about just good enough mail. They didn't have to have all of the whistles and great features that software companies want to put in it. They just wanted something simple that was secure. They didn't want to have a whole staff of IT professionals, because IT professionals are hard to retain now in the marketplace. There's an interest in companies outsourcing it. Security probably was the lead question in the discussions that I had when I was trying to sell software. It's definitely a concern.

Thanks to Dr. Todd for taking the time to speak with us about new initiatives at the University of Kentucky.

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Solo: Fifteen Steps to Help One Support Many

by Elwin W. McKellar

In *Into the Woods,* Stephen Sondheim wrote: "No one is alone." However, when I became the sole application support person for WebCT on the Michigan Tech campus about four years ago, I felt very alone. Not only did I survive, but I also made it work for me.

Although my first efforts, including seminars, lab sessions, online help, and training publications were only marginally successful, I was running myself ragged. The traditional classroom lecture and lab approach wasn't working well, so I began to experiment—turning liabilities into assets. The following 15 guidelines and recommendations grew from that experience:

1. Recognize and publish your limitations. False expectations (for example, 24/7/365 availability) may ruin your credibility.

2. Make e-mail your front door. Use it to schedule your meetings *and* your phone calls.

3. Use a trouble ticket system, like WebRT, to track your e-mail requests, making it easier to get some backup (so you can take a day off) and avoid lost requests.

4. Ask faculty members what they want to accomplish online, and create courses with only the necessary tools to accomplish those goals. Don't overload them with too many options.

5. Meet face-to-face and one-on-one for the first session.

6. Meet in your office. This gives you "home court advantage" and leaves the visitor a measure of control—because they can always leave.

7. Make sure that when users leave your office, they can go immediately to their offices, log in, and start to work on their courses. Follow small successes with more small successes.

8. Explain how to fix a problem. If a faculty member reports a problem he or she can fix, take the time to write a mini-tutorial e-mail on how to fix the problem. Be sure to keep a copy.

9. Keep a library of mini-tutorials—to cut and paste answers in future e-mail responses. Your e-mail folders are a convenient place to store these templates.

10. Put time aside to play with the software. Use it to do things for which it was never intended. You can bet someone will probably try the same thing and call you to ask why it didn't work.

11. Build a course and enroll all faculty using your software in the course, not only to let them experience the software from the student perspective but also to provide a collaborative sharing and development area.

12. Feed them. Schedule Brown Bag Seminars, where faculty members bring their own lunches and you provide coffee, soda, and juice. Make these seminars open-sharing sessions with a live instance of the software projected for all to share.

13. Encourage users to help each other, and facilitate building those relationships.

14. Know your user experts for peer referrals. There is always someone who knows more than you do about something.

15. Remember triage—establish criteria for setting priorities, and stick to them.

Some of these guidelines apply only to working with course management software, yet the concept of turning liabilities into assets is universally applicable. I currently use this system to provide application support to 115 course designers (faculty, etc.) with 311 courses that service more than 6,000 students. It works for me; it can work for you.

Mick McKellar is editor/analyst at Michigan Technological University. He serves on the editorial review board for the *ACUTA Journal* and contributes from time to time from his own experience as well. Reach Mick at mckellar@mtu.edu.

Bridgewater State College

by Patrick Cronin and Bill Davis

In a three-year project, Bridgewater State College (BSC) has networked all buildings and administrative offices of the town of Bridgewater, Massachusetts–including regional schools, the town library, and senior center–and implemented an extensive array of technology equipment, services, and support. The project was wholly funded and staffed by the college and has provided a new and comprehensive technology environment for town government, including physical infrastructure (fiber, cabling, etc.), desktop computers and servers, and specialized applications software for town administrative offices (assessor, treasurer, police, and fire).

The project represents a true "town and gown" collaboration. Responsibility for the project governance and management was shared between the college and town. In exchange for the new technology provided by the project, the town of Bridgewater gave BSC an abandoned school building that adjoins college property. The building has since been refurbished and converted to classrooms and offices badly needed by the college.

Town officials recognized for several years the need for the town to modernize business processes and technology in town offices. Despite this recognition, it was difficult for the town to pull together the political support, funding, and expertise necessary to move forward with such a project. Discussion of new technology systems for the town was frequently raised in meetings, only to stall out in the face of these significant

barriers. The most important objectives for the town and its employees were the following:

· Connect all town offices with high-speed data network

· Improve communication with employees and residents via e-mail and electronic distribution lists

· Create a highly visible presence on the Internet with a Web site to provide important information and services to town residents

· Provide extensive technology training for both employees and residents on productivity tools as well as specialized business applications

· Ensure that the solution is scalable to meet the town's future technology needs

At the same time, the college was undertaking a large-scale construction project and faced the possibility that it would be necessary to invest hundreds of thousands of dollars in temporary classrooms to allow the renovation of other campus buildings to move forward. The most important goals of the college were the following:

· Acquire an abandoned elementary school building for college classroom and office space to replace other space taken out of service during building renovations in lieu of temporary classrooms

· Improve the relationship between our college and the community in which it resides

What makes this project unique is the creative partnership between two separate institutional entities–with distinctive funding, constituencies, and needs–to collaboratively solve problems to their mutual benefit. It is also noteworthy that the investment today in technology is enabling and promoting significant new collaboration and interaction between town government, town residents, and the college. The success of the partnership has led to a marked improvement in town-gown relations. Communication between the town and college has never been stronger. A new College/Community Relations Committee has been established to formalize these channels of communications moving forward. The committee has begun to implement new programs such as sharing of resources between town and college libraries.

Planning, Leadership, and Management Support

Once the town and college came to understand each other's needs, the college proposed to use its technology expertise to develop services for the town in exchange for support from the town in the college's acquisition of the abandoned school building. Through late 1999 and early 2000, the town and college jointly defined the scope of technology services that BSC would deliver. Many constituencies provided input, including the town's network committee, the college's president and senior administration, college technology leaders, town elected officials, community residents, and of course, town and college legal counsel. The completed agreement was finalized in the fall of 2000.

Important factors that shaped the early stages of the project included the limited initial technological capabilities of the town and its employees, the absence of a technology department or staff in the town, ample but not limitless resources–both financial and personnel–to support the implementation, and the disjointed organizational structure of the town government. These factors led the project planners to focus on standards-based, commercial off-the-shelf solutions wherever possible to minimize the complexity of both initial implementation and long-term support. In addition, solutions were selected that favored onetime capital costs over long-term recurring operational costs in order to minimize the future operating expenses for the town. For example, the project called for fiber installation between buildings wherever feasible rather than leasing circuits from commercial providers.

The college also recognized that an important component of the project's success would be public visibility and

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support from town residents. It was important that the project provide not only infrastructure and systems but also "outward-focused" services that encouraged residents to get a feel for how the new technology could benefit them. Toward this end, the college created wireless networks in both the town library and senior center, built a small computer training lab, and offered technology training for the public on Internet browsing, e-mail, and productivity applications.

As the project moved forward, it involved staff from all departments of the college's information technology division. The telecommunications department was responsible for cable infrastructure, routers, switches, and services such as DHCP and DNS, and also provided overall leadership and management for the project. The technical services department installed and supported desktop computers, servers, and all file, print, and applications services to the networked clients. The college business systems group coordinated the implementation of town business applications for the treasurer, assessor, police, and fire departments. The user support group provided help desk services for the town and offered training for town employees and residents.

The broad participation of staff from across the college's IT division enabled the college to leverage existing expertise for the project and spread the increased workload evenly across many staff members. It also allowed the project to proceed with very minimal additional training and on a relatively quick timeline. Again to reduce overhead, the tools for planning and managing the project were the same tools we use in the daily operation of the college, including office productivity software (Word, Excel, PowerPoint) and extensive use of our help desk trouble ticket software, AIM, and Microsoft Project.

With encouragement from the college, the town established a standing committee to coordinate the town's input on project planning. The committee conducted inventories of existing desktop computers, wiring, and systems to help identify and prioritize the technology needs of town departments. Once word of the project spread through the town, there was healthy competition among town departments to be first on the network. The committee served a valuable role by recommending the order in which to network the many town departments.

Regular meetings between college and town officials helped ensure the smooth implementation of the project. There were weekly project meetings of the project managers from both the town and the college. Agendas and meeting minutes tracked the implementation and identified any problems or areas of concern. This group was also responsible for communicating the status of the project through the Web and e-mail to other project stakeholders and identifying areas in which new policy and procedures may have been needed.

A second oversight group, consisting of town selectmen and college vice presidents, met bimonthly to address any proposed changes to project scope (for example, additional workstations or an expansion of the network to another building) and to ensure full communication about the project between both organizations at the highest levels. The director of telecommunications at the college serves as the overall project manager and coordinates the activities of all college departments involved in the project.

Promotion of Technology and Maturity of Effort

Bridgewater State College is recognized as a regional leader in the application of technology in higher education. A strong network infrastructure consti-

tutes the foundation upon which the college is building leading-edge technology services. Core network services include the following:

· Campuswide wireless network with more than 160 wireless access points to provide coverage inside and outside all buildings and thoroughfares

· Gigabit Ethernet backbone with 10/100 switched to every office desktop, lab, and classroom and residence hall bedroom

· Voice recognition dialing directory and enterprisewide network fax services from all desktop computers

The college's strong record of technology accomplishment culminated in our recognition by *Yahoo! Internet Life* as one of the top universities in the country in our use of technology. In Massachusetts, only MIT and Harvard joined BSC on the top universities list.

The town project leverages the college's experience with a wide range of technology to provide best-of-class technology infrastructure and services for the community. The project establishes connectivity to 15 town buildings using three different technology solutions. Fiber-optic cable was installed to connect five downtown buildings. Fiber was selected for these buildings, which house the majority of town employees, because of its relatively low cost for high capacity. Across this fiber, we are running a Gigabit Ethernet backbone with 10/100 switched ports for every office desktop across Enterasys Smart Switch routers and Vertical Horizon switches.

The second connectivity solution uses the town's institutional broadband network (Inet), a separate broadband cable network provided to the town by the local cable TV franchise owner, AT&T Broadband. Taking advantage of this preexisting cable plant, we have established

reasonably high-quality and high-speed access to buildings housing fewer employees at lower cost than fiber. Utilizing Inet with bridge routers and switches from Cisco, we connected another five buildings onto the Gigabit Ethernet backbone with asymmetrical speeds of 10 Mbps upstream and 40 Mbps downstream.

The third connectivity solution utilizes the private gigabit digital subscriber lines (DSLs) for buildings that are remote from the downtown but within the service area of the local central office of Verizon. Using unloaded "dry circuits" with Ethernet line drivers and Cisco switches, we are able to achieve the line speeds of about 2 Mbps. Since most of these remote locations have few computers—for example, at the town golf course and the highway, sewer, and recreation departments—the bandwidth has proved more than adequate at a very low cost. One drawback of this solution is the monthly recurring cost, although it is only about $70 per month per building, for the Verizon circuits for these remaining five buildings.

Computer hardware for the project consists of Dell GX240s desktop computers running Windows 2000 and five Dell PowerEdge 2450 servers. On these platforms we provide e-mail service using Microsoft Exchange 2000; file, print, DNS, DHCP, and active directory services utilizing Microsoft Windows 2000 server; Web services including Web mail using Microsoft IIS Server; and backup services utilizing Arcserve. Town business applications purchased for the project include Financial Management and Receivables software from Data National, Assessor software from Appraisal Consultants of New England, and PoliceServer and FireServer from Pamet Systems. A SonicWall SOHO 3 firewall protects these administrative systems and the confidential data within them.

The project team installed Microsoft Office 2000 on approximately 100 desktop computers on the town network and configured five Windows 2000 servers. We created 15 workgroups that follow the town's organizational structure. Wireless networks were implemented in two buildings, the town library and senior center, using Netgear wireless hubs/ switches.

To support the town as it develops experience with the new systems, the college is managing the entire infrastructure for three years. We have integrated the town infrastructure into the college's network management platforms from Aprisma and Cisco. We provide the town's Internet services through college facilities and support the town through our college help desk

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in the same manner that we do for our faculty, staff, and students. We have also assisted the town in establishing and staffing a new technology department that will become increasingly responsible for supporting town IT services. The general approach has been to integrate town users, buildings, and infrastructure as seamlessly as possible into the day-to-day operations of the college without increasing staff.

Quality, Performance, and Productivity Measurements

To ensure a shared understanding between the town and college on the scope of the project, the project was described in detail in a formal project document endorsed by both institutions. Thereafter, progress on all project deliverables was regularly reported in two documents: a periodic status report and project budget updates. Among the measures reported in these documents are the following:

• Attendance at training sessions

• Inventory of equipment and software installed

• Wiring records from the installer

• Financial reports of expenditures

• Help desk trouble tickets

• College staff time committed to the project

This information ensures that we fulfill all commitments of the agreement in a timely manner. Additional measures of project performance include these:

• Network connectivity and response tests to ensure performance

• Satisfaction surveys of training session participants with suggestions for additional training topics

• Mean-time-to-repair on help desk trouble tickets

Since the "build out" phase of this complex project is only recently completed, a full assessment of the impact of the project has not been undertaken. We do know, however, that the project has successfully achieved every goal detailed in our project documents and has developed a strong infrastructure to serve the current and future needs of the town. By every indication, support for the project is very strong among both town employees and residents, and town-college relations are at an all-time high.

Cost, Benefit, and Risk Analysis

Networking the town of Bridgewater makes sense from a number of perspectives—none greater than the financial benefits realized by both the college and town. If the college were to undertake construction of a new building with office and classroom

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Cost Analysis

Cash purchase of Hunt School	$225,000
Renovation of Hunt School	$475,000
Network and technology for town	$675,000
Total project cost	$1,375,000
$48/sq.ft. refurbished cost	$1,375,000/28,500 sq. ft.

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space in today's market, we would expect to pay at least $200 per square foot. The difference between market rate and actual costs for the refurbished school is $152 per square foot. This difference yields an approximate savings of more than $4,300,000.

As a result of the agreement, the college now owns a building that has 10 large classrooms and office space for several departments at a price per square foot that is significantly less than new construction cost. Although not a new building, it is more serviceable, and the location could not be better.

The town of Bridgewater is equally pleased with the results of the project. By statute, the college was prohibited from paying more than the appraised value of $225,000 for the abandoned school building. The college's contribution of staff time, technology expertise, and full financing for new technology for the town represented a threefold increase in compensation for the town, and accomplished for the town a project that was simply too complex and costly for the town to accomplish on its own.

Customer Satisfaction and Results to Date

As we draft this report, nearly every major goal of our multiyear collaboration has been successfully accomplished. A new high-speed data network is in place connecting 15 town buildings. A full-featured Web site has been constructed for the town. All town employees have access to a full range of network services from their desktops. One hundred computers have been connected to the town network, many of them supplied by the college. Three large-scale business systems have been implemented. Nine new training courses have been developed especially for town employees and residents, more than 60 training sessions have been offered exclusively for the town, and training for area residents is continuing in the town library and senior center. The project is on schedule and on budget, and satisfaction among all stakeholders is high. Perhaps best of all, the success of the partnership is encouraging further collaboration as both the town and college explore new ways to serve our region together.

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A Primer on Optical Networking

by Joseph Kershenbaum
and Edward Kershenbaum

In 1880, Alexander Graham Bell invented the photophone, which transmitted voice signals via beams of light. This device failed because of too many disruptions of the light beam—when the weather was cloudy, it didn't work. Today, technologies that generate and transmit light, referred to as photonics, have completely altered the telecommunications infrastructure. Networks that transmitted communications electrically over copper wires increasingly have given way to systems built of optical components and fibers.

Most telecommunications systems today are not yet completely optical. They rely on optoelectronic devices that convert electrical energy to light energy that is transmitted over a fiber-optic line. That light energy is then converted back to electrical energy by another optoelectronic device. The advent of fully optical networks is probably several years away.

Technological innovations such as optical networks frequently generate new terms and phrases. In case you haven't assimilated all of the language associated with this new technology, let's consider some explanations of a few of the more common terms that are associated with information dancing the light fantastic. Following that, we'll take a quick look at how optical systems work, and then we'll talk about the wireless future.

Generating the Signal: What Is a Laser?

To begin at the most basic level, a laser— the acronym for light amplification by stimulated emission of radiation— produces a narrow, finely focused beam of light. In a beam of such energy, all the waves have the same phase and frequency. A laser beam is very pure, with the light approaching a single wavelength.

A laser consists of a chamber, or *cavity,* in which atoms, ions, or molecules of a solid, liquid, or gas are amplified, or *pumped* with electricity or light. Mirrors at each end of the cavity allow energy to reflect back and forth and resonate, continually increasing in intensity. The energy emerges from the cavity as a continuous beam or series of pulses of light. The type of material in the cavity of a laser determines the wavelength of the output.

Lasers create the light pulses that travel through optical fibers. In optical networks, the lasers are semiconductors about the size of a grain of salt. They are typically known as laser diodes, semiconductor lasers, or laser chips.

Optical networks can use light sources other than laser beams for transmission of information along optical fibers. The LED, or light-emitting diode, is a semiconductor device that emits light when electricity passes through it. It differs from a laser in that it produces waves that do not have the same phase and frequency.

Organizing the Signal: DWDM

DWDM, or dense wave division multiplexing, also is called WDM, or wave division multiplexing. This technology allows two or more optical signals having different wavelengths to be transmitted simultaneously in the same direction over

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Figure 1: DWDM fiber-optic communications system.
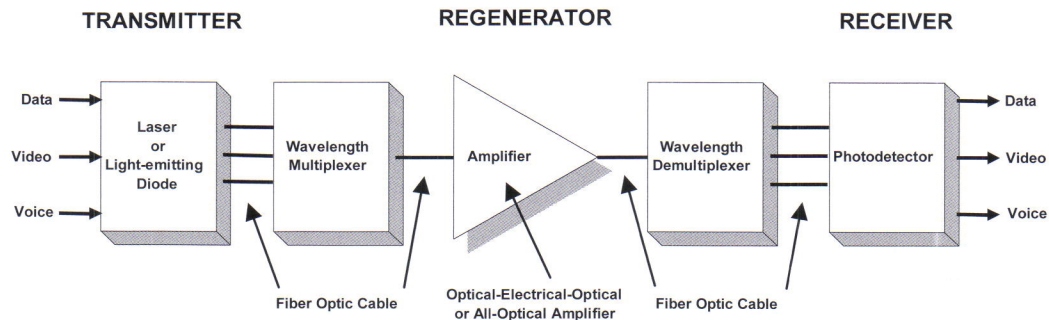
one optical fiber. Because optical fibers can carry many wavelengths of light simultaneously without interaction between each of them, DWDM greatly increases the amount of information that a fiber can carry.

DWDM combines up to 160 wavelengths of light per strand of fiber. The technology breaks white light into multiple colors (wavelengths). Each signal travels within its own wavelength, modulated by the information (e.g., data, voice, video) it is carrying. The signals are then separated by wavelength, or demultiplexed, at the end of the fiber. (See Figure 1.)

Carrying the Signal: Fiber-Optic Cable

Fiber-optic cable, designed to transmit light, is a thin plastic tube that consists of several layers of materials. As shown in Figure 2, at its heart is the core, which in telecommunications applications is a hair-thin strand of pure silica glass or multiple strands that are bundled together. In some specialized industrial and automotive control applications, the core may be made of plastic. The cladding, which also is made of glass, surrounds the core. The core and

cladding are bonded together during the glass extrusion process when the fiber is made and are inseparable. The core has a slightly higher refractive index than the cladding. This causes the cladding to act as a mirror. Thus, when light is guided down the core, it reflects off the cladding and back into the core. A plastic buffer coating surrounds the cladding and protects it from moisture or damage. A strength member covers the buffer and prevents stretching problems when the fiber is pulled through conduits. An outer covering, called a jacket, surrounds the strength member. Despite being made

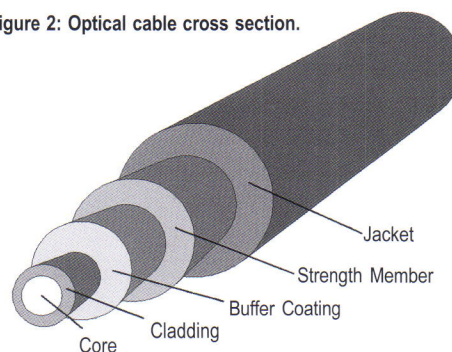**Figure 2: Optical cable cross section.**

of glass, optical fibers are flexible and strong.

In fiber-optic networks, information travels as light pulses through these optical fibers. Optical fiber can carry much more information than copper wire. Most telecommunications networks now are being built of optical fiber.

In addition to the increased capacity, or bandwidth, of optical fiber networks, communicating by light over optical fibers offers other advantages over communicating by electricity over copper wires. Photons travel through optical fibers several times faster than electrons travel through copper wires, thus reducing transmission times.

Light, unlike electricity, is not affected by electromagnetic or radio frequency interference. The error rate of information transmitted via light is significantly lower than of that transmitted by electricity. Information can be sent over longer distances without the need to retransmit signals. Information also can be transmitted more securely because taps in fiber lines can be detected. Fiber cable carries no

current and therefore poses no danger, unlike live electrical wires. Finally, fiber cable weighs dramatically less than copper cables.

On the downside, fiber is more difficult to splice and, thus, to install and repair. Its inability to carry current has forced network designers to adopt new strategies to power remote equipment when replacing copper with fiber.

Regenerating the Signal: Optical Repeater

A repeater, or regenerator, is a device that amplifies or regenerates a signal to extend the distance it may accurately be transmitted. This is necessary because a signal weakens or erodes as it travels further from its source. In an optical system, a repeater receives the signal, cleans it up by removing noise and pulse deterioration, and then amplifies and retransmits it. A signal may travel through one or more repeaters.

Two types of optical repeaters exist: optical-electrical-optical (OEO) and optical-optical-optical (OOO). OEO repeaters convert photons into electrical signals before regenerating and retransmitting them optically. OOO repeaters are known as fiber amplifiers.

A fiber, or optical, amplifier is a device that boosts a light signal in an optical network without first converting it to an electrical signal. In other words, it acts on the light directly. Common kinds of fiber amplifiers include erbium-doped fiber amplifiers (also known as erbium amplifiers or EDFAs), Raman fiber amplifiers, and silicon optical amplifiers (SOAs).

Sorting Out the Signals: Optical Switch

A switch is a device for making, breaking, or changing the connections in or among communications pathways. An optical switch, also known as a photonic switch or optical cross-connect, performs this function with light as it travels through an optical network.

The two broad categories of optical switches are hybrid optical switches with electrical cores (OEO switches) and all-optical (OOO) switches. OEO switches convert light pulses into electrical signals to switch them between fibers, then convert them back to light. OEO switches are subject to the speed limitations of electrical switching.

An all-optical switch maintains a signal as light from input to output. This greatly increases network speed. The prevailing all-optical technology is micro-electro-mechanical systems, or MEMS. MEMS switch light by using tiny mirrors to reflect a light beam from one fiber to another.

A Look into the Future: Wireless Optical Networking

Wireless networking has emerged as an efficient means for delivering data, voice, and video. In general, fiber-optic cabling or traditional copper plant is used for long-range transport. In office local area networks (LANs), wireless networking based on conventional radio frequency (RF) technology is now commonplace, due to the proliferation of laptop computers and handheld devices. To link buildings and campuses together, wireless optical networking is emerging as an alternative solution to RF and conventional copper or optical fiber–based links. Instead of sending beams of light along a glass fiber, wireless optical networking sends laser beams over the air. This is known as atmospheric laser trans-

mission, free space optics (FSO), or free space photonics (FSP).

RF wireless technology offers longer-range transmission capabilities than FSO, but FSO provides much greater bandwidth capacity. Additionally, RF-based networks require significantly greater capital investment because spectrum licenses must be purchased.

FSO functions by optically aligning two or more laser transceivers with a clear line of sight between them. A transceiver both transmits and receives signals, so there is full duplex (bidirectional) capability.

Four different FSO configurations exist. The first type is a dedicated point-to-point link between two terminals, such as two buildings. In the second, a point-to-multipoint architecture, a hub is placed on a tall building. The hub transmits to and receives signals from either the roofs or windows of surrounding buildings. The third kind of configuration is a series of transceivers connecting building roofs in a ring. The fourth method consists of short, redundant links connecting building roofs in a mesh configuration.

One great advantage of FSO is that it eliminates the lengthy regulatory process and associated costs of obtaining permits, digging trenches, and laying fiber-optic cable. Further, no spectrum license is required, an important consideration as the RF spectrum has become crowded and license fees have risen. FSO is highly directional, offering transmission security. Finally, an FSO system can be set up in a matter of hours and can operate over a distance of several

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kilometers. An example of this occurred in September 2001, after the World Trade Center tragedy, when FSO vendor Terabeam deployed a system linking Merrill Lynch & Company's offices in lower Manhattan and northern New Jersey across the Hudson River, a distance of 1.5 miles.

A number of problems are associated with FSO systems, among them:

• The leading concern is that atmospheric conditions may affect performance. Rain, snow, dust, and smog can block light transmission and thus disrupt service, but fog presents the greatest problem of all. Dense fog disrupts and dissipates laser signals because its small, dense moisture particles act like billions of tiny prisms. Although technological advances have helped to minimize this concern, weather issues can limit the distance between transceivers.

• Laser beams may misalign when buildings move because of solar and wind loading or small earthquakes, although systems with autoalignment capabilities resolve this issue.

• Very small pockets of turbulent air may disrupt transmission, but the use of multiple transmitters and receivers solves this problem.

• Flying objects, such as birds, can disrupt communications and require retransmission of information, although this is not a concern for redundant mesh configurations.

Wireless optical networking offers an exciting opportunity to increase communications options and decrease connectivity bottlenecks in dense urban areas. The potential combination of generally reliable performance, low costs, bandwidth scalability, and rapid and flexible deployment points to a bright—and light-filled—future.

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The Right Way to Make a Name for Yourself

by Kevin Tanzillo

Sometimes *who you know* is a whole lot more important to your career than *what you know*. But there is another variable involved that doesn't get the attention it deserves, and that is *who knows you*. Even though so much of what you do in communications technology takes place behind the scenes, you can still take control of your reputation and make more of a name for yourself—on campus and beyond.

You may never end up rich and famous, but when you promote yourself and your accomplishments in the right way, you make a positive impression on your bosses, your peers, and even potential future employers. The key words here are "in the right way," because if you do it incorrectly, you may be scorned as a publicity hound or end up simply overlooked.

The best piece of advice is to observe the protocol when it comes to self-promotion. Depending on your position on the organizational totem pole, you may need to start with your own supervisor or the department head. If you are in an appropriate position of authority, then the people you want to get to know are in the university public relations department.

Once you spend a little time with them, you will know what your boundaries are and what their role is when it comes to promoting yourself and your department. Even if they don't try to control your promotional activities, they will want to know about them, so do keep them informed. If you want to write an article for the ACUTA Journal,

or call up an editor at *Information Week* magazine, make sure your university PR department knows this. It will save you many headaches later.

They may even want to know if you talk to the university newspaper, although they will typically be most concerned about external communication. Warning: Some university PR departments function more like prison guards, whose job is to keep all information captive. If you have the misfortune of working with a department with this mindset, it will take a lot of charm as you seek to convince them in small steps that you can be trusted, that you only want to set small amounts of information free, and that what you want to publicize will make the university look good.

Your Best Ally

The university PR department can be a great ally, and if you want to arrange for a news release so that you can see your university (and your own name) in print in your favorite communications or networking magazine, you will need their help to do it.

Start by letting the PR people know of interesting things that you and your department are doing. If you are starting next June on a massive project to rewire the entire campus or if you are converting the entire campus to voice over IP communication, these are things that are well worth a news release.

A good PR department will jump at the chance to get positive publicity and will take the lead in preparing a news release. Be sure to work closely with

them, providing all the information they need (since they probably are not technology savvy, you may also have to make sure they have information they didn't even know they needed).

If possible, when they ask you, "Who should be quoted in this news release?" make it you. This could be one of those tricky protocol issues, so you may have to defer to a superior, but if it's in your power, make sure it is your name in there.

Be sure the PR department lets you have a close look at the news release before it is distributed, so that you can check it for technical accuracy. Cut them some slack if you can, because a university-issued news release will usually aim for a variety of publication audiences, not just technical people. Try to understand if it is written at a higher level than you might have preferred. But if you think it is just too dumbed down, ask if they can insert at least one paragraph toward the end that addresses the technical details sufficiently.

You also need to identify where it is that you want to be known. If you feel that being known on campus is important, focus on the university newspaper or the local newspaper. If being known by your peers across the industry is important, go for education and technology publications. You probably know many of these publications, and a little Internet research can lead you to a larger number. Your PR department certainly knows the education publications, but they may need your help in identifying the right technology publications.

Make Yourself Available

When it is time to distribute the news release about your project, make sure that you know the distribution day and time. Let the PR department know that you will be available for interviews if magazine or online publication editors contact your school to find out more. Editors are usually in a big hurry to

talk to someone if they are interested, so be sure the news release doesn't go out the day you're leaving on a two-week vacation. Editors won't want to wait until you return, and you will have missed the chance at publicity.

Often a vendor of yours will want to issue a news release because you have installed their routers or PBXs or software. Find out from your PR department their policies on this. Some PR departments say no to everything on the grounds that any such statement is an endorsement, but most will allow this so long as the news announcement sticks to the facts and doesn't put the university in an endorsing position.

Again, if you can work your own name into the vendor's announcement, go for it. Most such announcements contain at least one quote from the customer, and that is your opportunity.

If you do end up talking to magazine editors, remember that just as you don't promote a vendor, don't criticize one publicly either. It's one thing to knock a router's performance when you are talking to peers, but be very careful about confiding in a reporter unless you know him or her very well. By always speaking diplomatically, your words shouldn't come back to haunt you later.

Writing and Speaking

Another excellent means of promoting yourself is through your professional organizations, such as ACUTA. You see how each issue of the *Journal* is full of interesting articles about what different universities have done with technology. You can write an article like this about your own accomplishment.

You can also offer yourself as a speaker at an ACUTA (or other organization) conference, or let your vendors include you as a speaker or panelist at conferences and trade

shows that they attend. Once again, be sure of the university PR department's policies. They shouldn't object to your writing articles and speaking to professional organizations, but knowing your boundaries is always good.

If you do begin taking on speaking opportunities, remember that the better you "perform," the more your reputation is enhanced. If you don't feel you are a strong speaker (be honest with yourself!), then find a way to get trained for improvement. Toastmasters or similar organizations can do a lot to boost your confidence as a speaker. Likewise, if you are writing an article, it always helps to have a trusted friend or acquaintance look it over for misspellings or grammatical glitches. Just running it through the spelling checker isn't good enough.
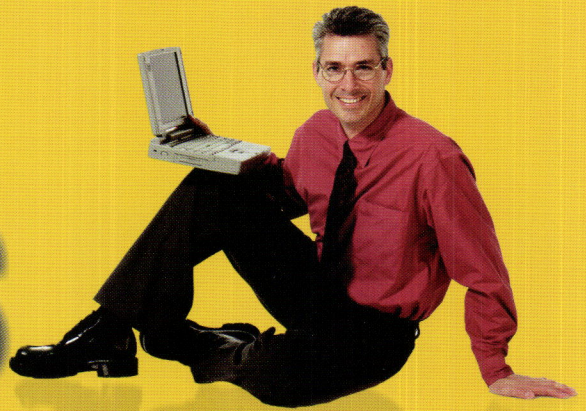
Web Sites and Crises

Your school's Web site offers another outlet for promoting your department's accomplishments and yourself. The typical university Web site has hundreds of informational nooks and crannies, and if your department doesn't have a page, work to get one put in place. Then promote the positive things you are doing on campus.

One other promotional opportunity comes along when bad things—network outages are just one example—happen to good universities. You surely have a crisis plan in place for your network and technical operations. Make sure a communications plan is part of that. If you can shine as a communicator when bad things happen, it enhances your reputation.

Kevin Tanzillo is vice president and heads the technology practice at Dux Public Relations in Richardson, Texas. He is a former magazine editor who covered ACUTA, and he writes the Tech Talk column in the monthly ACUTA newsletter. Contact him at kevin@duxpr.com.

ACUTA Leadership Award

Michael Palladino
University of Pennsylvania

At the annual conference in 2001, ACUTA introduced a Leadership Award that will be presented annually to an ACUTA member, associate member, or corporate affiliate for demonstration of outstanding leadership.

The person selected for this award actively participates in and promotes the education, professional development, and mentoring of other professionals. He or she has demonstrated innovation in establishing, changing, or otherwise materially affecting the existing practices, usage, and/or concepts applied to the telecommunications profession within higher education, that is, identifying and advancing telecommunications and/or information technology directions for the benefit of higher education. This person has also engaged in activities that have produced firm and formal results directly benefiting the ACUTA organization and/or the broader higher education community.

The Awards Committee selected Michael Palladino of the University of Pennsylvania as the recipient of the first ACUTA Leadership Award.

Highly regarded as a mentor, an advocate for change, and a technology visionary, Michael Palladino epitomizes leadership. His 20-year career in telecommunications finds him presently serving as associate vice president of networking and telecommunications at the University of Pennsylvania, where he leads a staff of more than 100 full-time IT professionals and manages annual budgets of more than $25 million in service to more than 35,000 users.

Throughout his career, Mike has been a pioneer in new technologies, bringing innovation to his campus and advocating organizational change to improve the quality of service to customers and facilitate the processes used to provide those services.

The individual who nominated Mike for this award shared that Mike's success lies in his ability to manage the organization into the future with the vision and spirit of an entrepreneur, while maintaining genuine connections with staff and customers alike through hands-on mentoring and kindness, gentle but inspiring alignment of vision, and the integrity of his own example. In his nomination for this award, Mike is commended by a colleague for his "dedication to delivering best cost for best service to our customers by the elimination of legacy systems and the active advancement of new technologies which have been ongoing trademarks of his successful leadership."

Mike's hands-on style of leadership is recognized and appreciated by his staff, whom he encourages to participate in professional development as they pursue personal career goals. His active role in the campus intern program is one example of his genuine interest in the success of others.

Despite the tremendous commitment required to lead his own organization through changes, Mike has found time to share his successes, challenges, and vision with fellow ACUTA members through presentations at ACUTA and other higher education organizations and acting as a respected mentor for fellow telecom and IT professionals.

ACUTA honors Michael Palladino for his leadership on campus as well as his service to the association. ▮▮▮

Advertisers' Index

By advertising in the *ACUTA Journal,* these companies are not only promoting products and services relevant to telecommunications in higher education, they are also supporting our association. As you have opportunity, we encourage you to mention to these companies that you saw their ad in our journal.

★ Indicates ACUTA Corporate Affiliate

For information about advertising in the *ACUTA Journal* contact KCS Intl., LLC.
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From the Executive Director

CRM from ACUTA's Viewpoint

**Jeri A. Semer, CAE
ACUTA Executive Director**

One of the great strengths of ACUTA members and their operations is their focus on customer service—creating positive relationships with a wide array of customers on and off campus. We hear from many sources that ACUTA representatives can take pride in their high levels of service, their responsiveness to customer needs, and the high standards of quality in communications technology services that they offer.

As services continue to change with new technology developments such as converged networks, voice and video over IP, wireless voice and data, PDA services, and so on, ACUTA members continue to stress quality, consistency, and reliability of service. They survey customers regarding their opinions and needs and make every effort to stay in tune with demographic trends and anticipate the communications habits of current and future students.

Our members must also monitor and anticipate faculty needs, facilitating and supporting the use of technology in teaching and research. This means keeping current on new developments in such areas as Internet2, governmental research grant and contract requirements, privacy and security regulations, and numerous other areas.

It is clear that good customer relationship management goes far beyond systems and software to include environmental scanning, constant communication with key constituencies, and solid market research.

In a way, ACUTA engages in the same activities when developing or evaluating services for our members. We seek input from various groups within the membership who are current or potential users of a product or service, making every effort to tailor it to your needs. By basing new products and services on information about our members' needs and preferences, we are seeking to be "knowledge based" in our decision-making processes. So, when you receive a questionnaire from ACUTA on any subject, please be assured that we respect your busy schedule but we need your input to shape our programs and services.

In addition to developing new products and services, we are committed to regularly evaluating all existing programs to determine whether they remain relevant. This fall, all committees, staff, and the Board of Directors completed our biannual review of 24 different programs and services. Every major activity, from the *Journal* to the annual conference, was subjected to a detailed examination including data from member surveys, statistics on participation, a financial review where appropriate, and recommendations for enhancement or improvement.

This process is particularly important in view of ACUTA's new Strategic Plan, which contains a number of action items for the development of new programs over the next one to three years. By reviewing current programs, we can ensure that ACUTA's human and financial resources are being directed to activities that make the most sense for our members' changing needs.

ACUTA has made an ongoing commitment to the future by setting aside a specific percentage of our operating budget each year for research and development—an innovative step for nonprofit organizations. In this way we ensure that a reasonable amount of resources is available for the development of new products and services to serve our members.

It is clear that, whether in campus communications technology or association management, those who become content with the successful status quo will find themselves falling quickly behind. Organizations that succeed over the long term are those that constantly test their assumptions, research the needs and preferences of their current and potential customers, and devote a significant portion of their time and resources to looking ahead.

Winter Seminars

January 12–15, 2003
Tempe, AZ
Wyndham Buttes Resort

I. Developments in Communications Technologies & Applications

This seminar will provide updates on technologies that are evolving such as IP telephony, IP video, speech recognition, and unified messaging. Support applications such as customer relationship management systems and other innovations that impact campus networks will also be featured.

II. Disaster Preparation & Business Continuity

Attendees will learn risk assessment techniques as well as ways to develop practical disaster plans. Techniques to evaluate risks and the potential costs of recovery will be covered, and specific campus examples will be offered. Protection of telephony as well as network facilities will be discussed.

For more details or to register online,

visit our Web site at

www.acuta.org

Spring Seminars

April 27–30, 2003
Norfolk, VA
Sheraton Norfolk Waterside

I. Wireless Technologies

Case studies of campus uses of wireless voice and data technologies including wireless to PDAs, G3, spectrum management and other wireless developments will be the focus of this seminar. Future directions, changing standards, and recommendations for investment in wireless will also be explored.

II. Regulatory Update

This seminar will analyze changes in the competitive telecom environment and update key issues involving wireless, broadband, licensing, security, or E911/411/711. Strategies to negotiate with carriers and other vendors will be addressed.

acuta

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